

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component A3

Geographic Region: North of Lake Okeechobee

Component Title: Storage Reservoir (same as Alternatives 1 and 2 with the exception of operations) – SEE COMPONENT FIGURE 1

Purpose: Storage reservoir to provide flood attenuation, estuary flow protection, and water supply benefits.

Operation: Inflows from Lake Okeechobee to be pumped into the north storage reservoir when the Lake stage is rising and is above the North Storage inflow line (0.75 feet below the pulse release zone of the current Lake Okeechobee regulation schedule). Releases will be made back to the Lake when the Lake stage falls below the North Storage outflow line (1.1 feet below the bottom of the level 1 pulse zone).

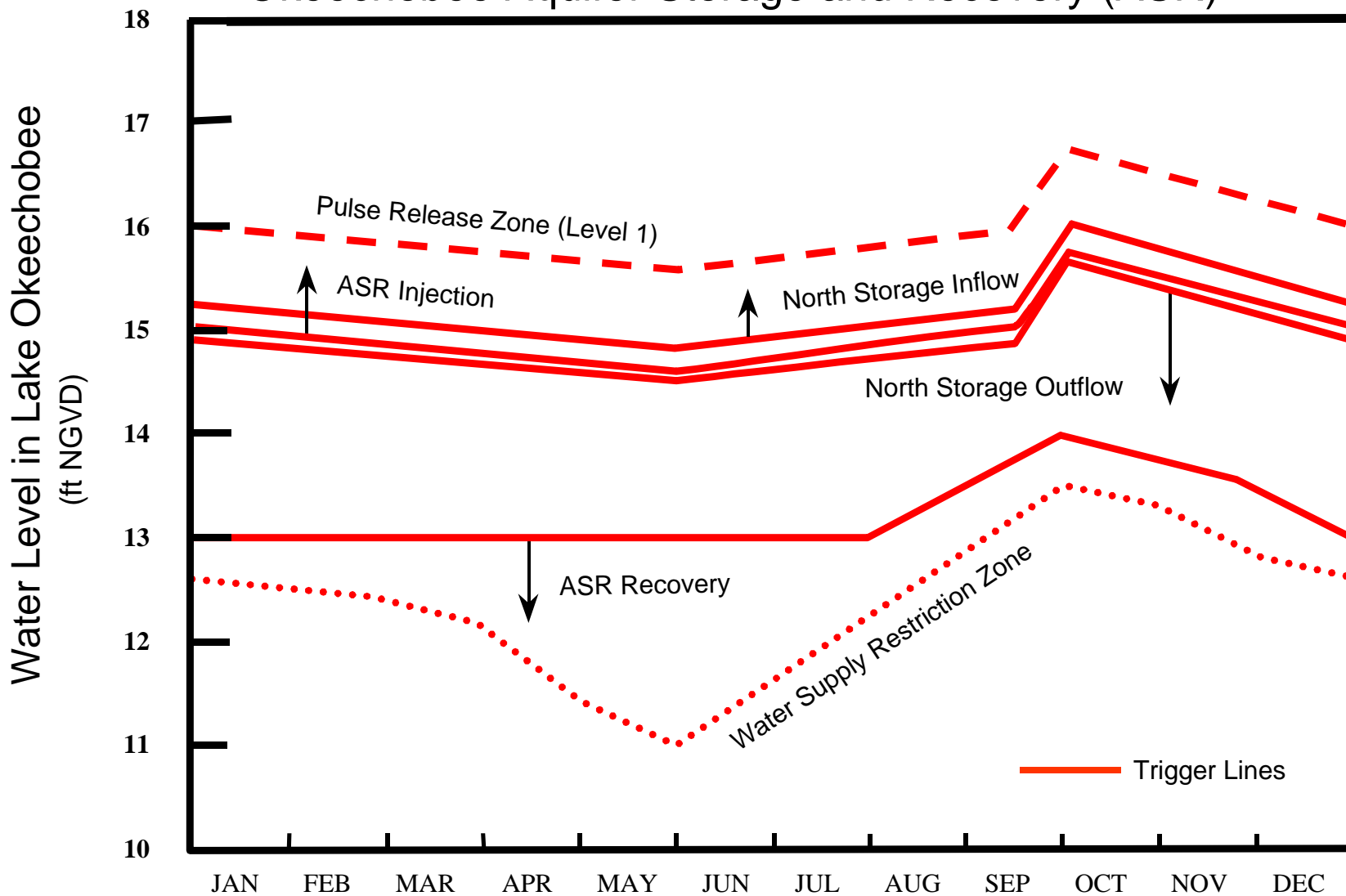
Design:  
20,000 acres at 10 feet maximum depth  
Inflow pump capacity = 4800 cfs  
Outflow structure = 4,800 cfs

Location: To Be Determined – Specific site not necessary for Water Management Model simulation  
Counties: Glades, Highlands, Okeechobee, Osceola, and Polk

Assumptions and related considerations:

- (1) Uncertainty in land availability
- (2) An alternative to capturing Lake water would be to attenuate flood waters before reaching the Lake. This could be done north of the Kissimmee River which could have positive impacts to the Kissimmee River Restoration Project or within the Taylor Creek/Nubin Slough which would improve water quality entering the lake.
- (3) Potential increase in stage duration of Lake Okeechobee.
- (4) Potential decrease in maximum stages of Lake Okeechobee

Figure 1. Trigger Lines for North of Lake Okeechobee Storage and Lake Okeechobee Aquifer Storage and Recovery (ASR)



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*C&SF Comprehensive Review Study – Alternative 3*  
Component B2

Geographic Region: St. Lucie/C-44 Basin

Component Title: Storage Reservoir (same as Alternative 2)

Purpose: Storage reservoir to capture local runoff from C-44. The reservoir will be designed for flood flow attenuation to the estuary, water supply benefits including environmental water supply deliveries to the estuary, and water quality benefits to reduce salinity and nutrient impacts of runoff to the estuary.

Operation:

Inflows from C-44 basin runoff (and only when Lake stage is > 14.5 ft)

Design:

10,000 acres at 4 feet maximum depth

Inflow pump capacity = TBD (initially assumed to not constrain performance)

Outflow structure capacity = TBD (initially assumed to not constrain performance)

Location: To be determined – Specific site not necessary for Water  
Management Model simulation

Counties: Martin

Assumptions and related considerations:

(1) Uncertainty in land availability

(2) Potential water quality benefits by reducing nutrient loading to the estuary

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component C1

Geographic Region: St. Lucie/C-44 Basin

Component Title: Environmental Water Supply Deliveries to St. Lucie Estuary  
(same as Alternatives 1 and 2)

Purpose: To provide freshwater flow to the St. Lucie Estuary to protect and restore more natural estuarine condition.

Operation: Deliver estuary target discharge through S-80 from the storage reservoir when water is available or from the Lake when the Lake stage exceeds 15 feet.

Design: Operational change only

Location: C-44 and St. Lucie Estuary

Assumptions and related considerations:

(1) Target Estuary delivery based on maintaining salinity conditions in the estuary to support Oyster community

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*C&SF Comprehensive Review Study – Alternative 3*  
Component D3

Geographic Region: Caloosahatchee/C-43 Basin

Component Title: Storage Reservoir(s) with Aquifer Storage and Recovery (ASR) (same as Alternative 2 with the exception of Lake Okeechobee regulatory releases to storage area)

Purpose: Storage reservoir(s) with ASR to capture basin runoff and releases from Lake Okeechobee. These facilities will be designed for water supply benefits, some flood attenuation, and to provide base flows to the Caloosahatchee estuary.

Operation: Inflows from Lake Okeechobee regulatory discharges and runoff from C-43 basin will be captured by both the reservoir(s) and ASR wellfields simultaneously. ASR wellfields will continue capture excess water even after reservoir(s) are full. Water from reservoir(s) will be used to supplement irrigation demands from Lake Okeechobee and provide water supply deliveries to the Caloosahatchee estuary when lake stages are below 15.00 feet NGVD (Caloosahatchee estuary demands are met from Lake Okeechobee when lake stages are above 15.00 feet NGVD). The ASR facilities will also be used to supplement irrigation demands but have a priority of meeting minimum flows to the Caloosahatchee estuary during times when Lake Okeechobee stages are below 15.00 feet NGVD.

Design:

Reservoir(s) total of 20,000 acres at 8 feet maximum depth.  
ASR wellfields total of 22 10-MGD wells

Reservoir(s) Inflow pump capacity = TBD (assumed not to constrain performance)  
ASR inflow capacity = limited to 220 MGD  
Reservoir(s) outflow structure capacity = TBD (assumed not to constrain performance)  
ASR outflow capacity = limited to 220 MGD

Location: TBD - Specific site not necessary for simulations

Counties: Hendry, Glades, Lee

Assumptions and related considerations:

- 1) Uncertainty in land availability.
- 2) Potential water quality benefits by reducing nutrient loading.

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- 3) Raw water ASR injection permissible.
- 4) 70 percent recovery for injected ASR water.
- 5) Size of injection bubble not limited.
- 6) ASR facility sized to slightly exceed minimum flows to estuary.

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Component E1

Geographic Region: Caloosahatchee/C-43 Basin

Component Title: Environmental Water Supply Deliveries to Caloosahatchee Estuary (same as Alternatives 1 and 2)

Purpose: To provide freshwater deliveries to the Caloosahatchee Estuary to establish desirable salinity at locations of key estuarine biota.

Operation: Deliver desired estuary target flow through S-79 from the storage reservoir when water is available or from the Lake when the Lake stage exceeds 15 feet.

Design: Operational change only

Location: C-43 and Caloosahatchee Estuary

Assumptions and related considerations:

(1) Estuary deliveries based on maintaining salinity conditions in the estuary to support a range of aquatic vegetation seagrass, invertebrates, and fish communities.

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Component F3

Geographic Region: Lake Okeechobee

Component Title: Lake Okeechobee Regulation Schedule (same as Alternatives 1 and 2)

Purpose: Operating criteria for Lake Okeechobee that includes flood control, water supply (including releases to the Water Conservation Areas to meet estimated natural system needs), and Lake littoral zone and estuary protection.

Operation: Use current regulation schedule (known as Run 25) with the exception of eliminating all St. Lucie regulatory discharges (except emergency releases - zone A).

Design: Operational change only. Modify the regulation schedule by eliminating all but emergency discharges to both the St. Lucie and Caloosahatchee Estuaries.

Location: Within existing boundary of Lake Okeechobee  
Counties: Glades, Hendry, Martin, Okeechobee, and Palm Beach

Assumptions and related considerations:

(1) It is assumed that the implementation of other project components will reduce the frequency of high Lake stage events therefore reducing the need for regulatory releases to the St. Lucie and Caloosahatchee Estuaries.



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*C&SF Comprehensive Review Study – Alternative 3*  
Component G3

Geographic Region: Everglades Agricultural Area (EAA)

Component Title: Storage Reservoir (similar to Alternative 2 with the exception of the division of the reservoir into 1-20,000-acre compartment for supplying EAA irrigation demands and 1-40,000-acre compartment for supplying environmental demands)

Purpose: Storage reservoir to: improve timing of environmental deliveries to the Water Conservation Areas including reducing damaging flood releases from the EAA to the Water Conservation Areas; reduce Lake Okeechobee regulatory releases to estuaries; to meet supplemental agricultural irrigation demands; and increase flood protection within the Everglades Agricultural Area. Conveyance capacity of the Miami and North New River Canals between Lake Okeechobee and the Storage Reservoirs are increased to convey additional Lake Okeechobee flood control releases that would have otherwise been discharged to the Caloosahatchee and St. Lucie Estuaries.

Operation: Inflows are from Lake Okeechobee regulatory discharges and runoff from Miami & North New River canal basins. The reservoir will be divided into two compartments.

Compartment 1: 20,000 acres, meets EAA irrigation demands only. The source of water is excess EAA runoff (inlet capacities for excess runoff (2700 and 2300 cfs) and outlet capacities for EAA demands same as Alternative 2). Overflow to compartment 2 occurs when depth of water in compartment approaches 6 ft maximum and Lake Okeechobee regulatory discharges are not occurring or impending. Excess EAA runoff is diverted to this compartment ONLY if WCA-3A is too deep.

Compartment 2: 40,000 acres, meets environmental demands as a priority, but can supply a portion of EAA irrigation demands if environmental demands equal zero. The sources of water are overflow from compartment 1 and Lake Okeechobee regulatory releases.

The EAA Conveyance is doubled for Lake Okeechobee regulatory releases as in Alternative 2. Structures with a capacity of 4500 cfs for regulatory releases from Lake Okeechobee via Miami Canal and a capacity of 3000 cfs for releases via North New River Canal are added for Compartment 2. When the reservoir depths fall below 0.0 feet, Lake Okeechobee is used for meeting these demands. The flows will be delivered to the Water Conservation Areas through Stormwater Treatment Areas 3 and 4.

Design:

Compartment 1: 1-20,000 acre reservoir at 6 ft maximum depth

Inflow structure capacity: inflow pumps of 2700 cfs Miami Canal Basin and 2300 cfs North New River Canal Basin for diversion of EAA runoff

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Outflow structure capacity:

To Everglades Agricultural Area: 1-3000 cfs structure to Miami Canal Basin and 1-4400 cfs structure to North New River and Hillsboro Basins (initially assumed to not constrain performance).

Compartment 2: 1-40,000-acre reservoir at 6 ft maximum depth

Inflow structure capacity:

inflow pumps of 4500 cfs and 3000 cfs for diversion of Lake Okeechobee regulatory releases

Outflow structure capacity:

To Stormwater Treatment Areas 3 and 4: 3600 cfs @ 6 ft head.  
Increase in Miami & North New River Canal capacities (200%)

To Miami Canal: 4500 cfs

To North New River Canal: 3000 cfs

Location: To be determined - conceptually located between Miami & North New River Canals for Water Management Model simulation purposes only.

Counties: Palm Beach

Assumptions and related considerations:

(1) Land Availability

(2) Modifications to Stormwater Treatment Areas if needed for Everglades water deliveries to meet the appropriate water quality.

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*C&SF Comprehensive Review Study – Alternative 3*  
Component H1

Geographic Region: Water Conservation Areas and Everglades National Park

Component Title: Everglades Rain-Driven Operations (same as Alternatives 1 and 2)

Purpose: Improve timing and location of water depths in the Water Conservation Areas and Everglades National Park.

Operation: Rainfall-driven operational rules with NSM-like hydrologic conditions triggering deliveries to the Water Conservation Areas, between the Water Conservation Areas, and to Everglades National Park. ***These rules are the same as those used in Alternative 5 of the Lower East Coast Regional Water Supply Plan.***

Design: Water will be delivered through the Stormwater Treatment Areas prior to entering the Water Conservation Areas and will be distributed to improve hydropatterns. Flows to Everglades National Park will be through water control structures along Tamiami Trail (S-12s, S-333, and S-355 structures).

Location: Within the existing boundaries of the Water Conservation Areas and Everglades National Park.

Counties: Broward, Dade, Monroe, and Palm Beach

Assumptions and related considerations:

- (1) Consideration given to tree islands and minimum floor levels consistent with SFWMD's proposed minimum flows and levels for these areas.
- (2) Potential increase in hydropatterns in dry areas and decrease in hydropatterns in deep water areas.

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*C&SF Comprehensive Review Study – Alternative 3*

Component I3

Geographic Region: Water Conservation Areas and Everglades National Park

Component Title: Improved Conveyance between Water Conservation Area 3B and Everglades National Park (modified from Alternatives 1 and 2 changes S-355 structures to pumps)

Purpose: Improve water deliveries to Everglades National Park from Water Conservation Area 3B by increasing conveyance capacity through L-29 and US Highway 41 (Tamiami Trail).

Operation: Increase conveyance by converting S-355 structures to pumps totaling 2000 cfs capacity. Elevating or bridging portions of US Highway 41 (Tamiami Trail) will remove water level constraints allowing greater conveyance into Everglades National Park. The pumps would be operated consistent with Everglades Rain-Driven Operations Component H3.

Design:

- (1) Two 1,000 cfs pumps instead of the S-355 structures proposed as part of the Modified Water Deliveries Project. This would provide pump conveyance capacity of 2,000 cfs.
- (2) Raise Tamiami Trail by bridging and elevating portions of the Trail below Water Conservation Area 3B.

Location: Within the existing boundaries of the Water Conservation Areas and Everglades National Park.

Counties: Dade, Monroe

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*C&SF Comprehensive Review Study – Alternative 3*  
Component J  
(not included in Alternative 2 or Alternative 3)

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*C&SF Comprehensive Review Study – Alternative 3*  
Component K2

Geographic Region: Water Preserve Area - Palm Beach County

Component Title: L-8 Project (same as Alternative 2) -- SEE COMPONENT MAP 1

Purpose: Reduce water supply restrictions in the Northern Palm Beach County Service Area by capturing more of the annual discharges from portions of the southern L-8, C-51 and C-17 basins and route this water to the West Palm Beach Water Catchment Area. Intent is to increase water supply availability and provide pass through flow to enhance hydroperiods in Loxahatchee Slough and increase base flows to the Northwest Fork of the Loxahatchee River.

Operation: Capture excess L-8, C-51 and C-17 basin water to meet urban water supply demands in the Northern Palm Beach County Service Area and enhance hydroperiods in the Loxahatchee Slough. Water would be diverted through the M-canal to the Water Catchment Area. Stormwater treatment areas will be provided to meet all water quality standards required if necessary.

Design:

- Increase the pumping capacity from the L-8 Tieback into the M-Canal to 300 cfs to increase the volume of water captured from the southern L-8 canal and deliver it to the Water Catchment Area. This pump has dual purpose, 1) to capture L-8 basin runoff when available and 2) to deliver regional deliveries when needed.
- Assume that the Indian Trail Improvement District will adopt an operation plan which promotes water conservation by prioritizing discharge so that excess storm water is first offered to the City of West Palm Beach Water Catchment Area and secondarily discharged through off peak releases to the C-51 Canal via the M-1 Canal. For this alternative pumping from Indian Trail Improvement District into the M-Canal for subsequent discharge into the City of West Palm Beach Water Catchment Area will be assumed to occur under the following conditions
  - When the City of West Palm Beach Water Catchment Area has sufficient need for imported water as defined by being below 18.2 feet NGVD.
  - When water levels in the Lower M-1 Basin exceed 14.0 feet NGVD during the wet season (June 1 through October 31) or 16.0 feet NGVD during the dry season (November 1 through May 31) the Lower M-1 Basin may discharge up to 200 cfs for subsequent storage.
  - When water levels in the Upper M-1 Basin exceed 15.0 feet NGVD during the wet season or 16.0 feet NGVD during the dry season) the Upper M-1 Basin may discharge up to 300 cfs for subsequent storage.
- Increase conveyance of the M-canal between the pump and the Water Catchment Area to accommodate the increased inflow from the L-8 Canal and

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the Indian Trail Improvement District.

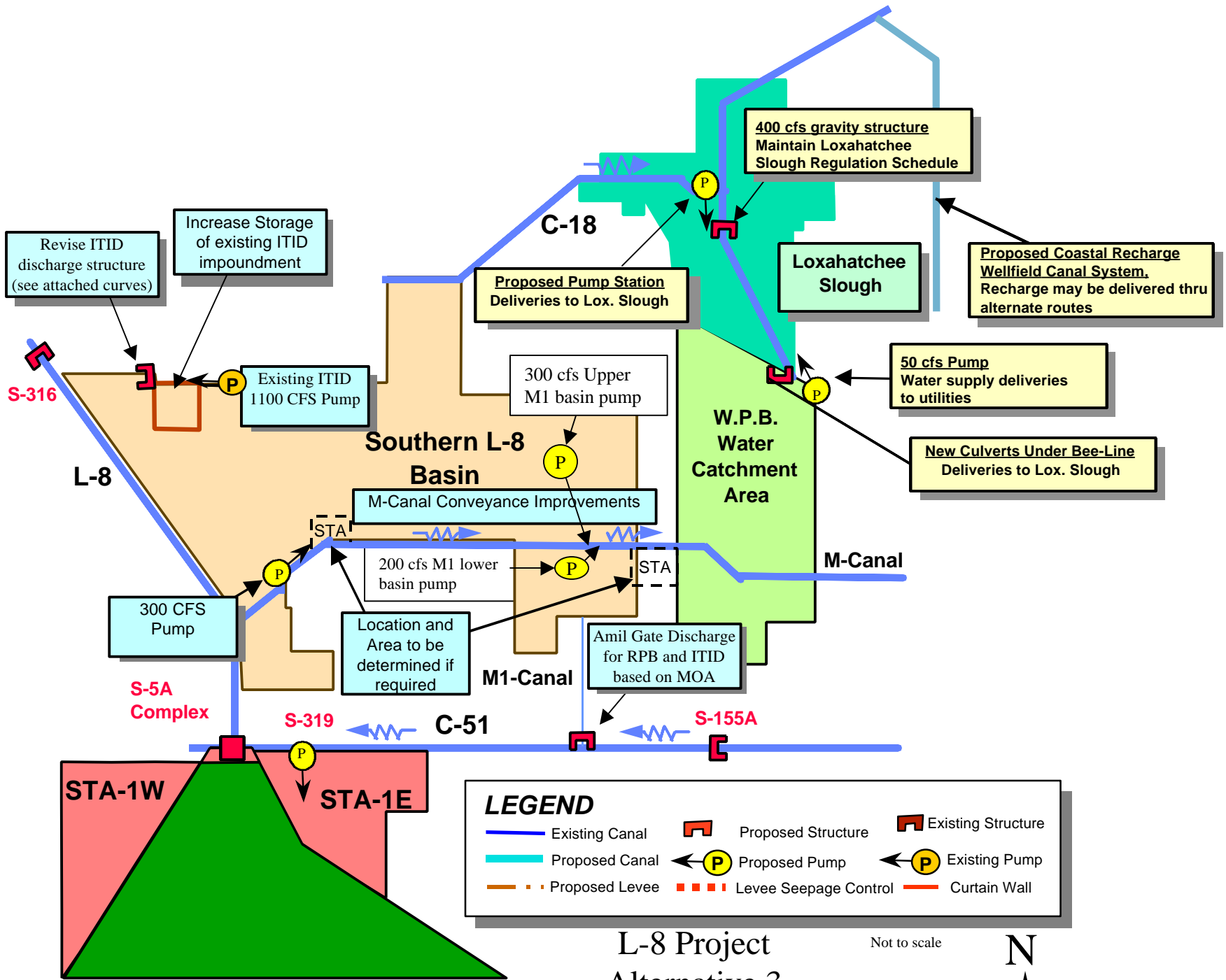
- Install a new structure in the south leg of C-18 just south of the west leg to facilitate better management of water levels and discharges from the Loxahatchee Slough. The new gravity structure would consist of a variable discharge up to 400 cfs and emergency overflow weirs.
- 50 cfs pump for water supply deliveries to utilities.
- New culverts under Bee-Line Highway for up to 100 cfs deliveries to Loxahatchee Slough.
- Eliminate ASR component described in the Future Without Project Condition

Location: Southern L-8 Basin including the Indian Trail Improvement District, West Palm Beach Water Catchment Area, and the Loxahatchee Slough

Counties: Palm Beach

Assumptions and related considerations:

- (1) Should help maintain stages in the Loxahatchee Slough and reduce high discharges to the southwest fork of the Loxahatchee River.
- (2) Stormwater Treatment Area upstream of the Water Catchment Area may be needed.
- (3) Secondary structures (recharge canals) may be needed downstream of the Water Catchment Area to provide water to achieve the desired result.
- (4) Due to lack of long term storage (ASR) hydroperiod enhancements within the West Palm Beach Water Catchment Area are not being considered in the alternative.



L-8 Project  
Alternative 3  
Component Map 1

Not to scale





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*C&SF Comprehensive Review Study – Alternative 3*  
Component L3

Geographic Region: Lower East Coast Service Area

Component Title: Change coastal wellfield operations (Modified from Alternative 2 to include Riviera Beach, Dania, Miramar, and Broward County 3A)

Purpose: Shift demands from eastern wellfields to western facilities away from the saltwater interface to reduce impact of salt water intrusion.

Operation: For coastal utilities in the Lower East Coast Service Area which are experiencing an increased threat of saltwater intrusion, demands will be shifted from the eastern facilities to the western facilities away from the saltwater interface. The volume shifted is dependent upon the degree of saltwater intrusion but is generally proportional to the increase in demands between the 1995 existing conditions and the 2050 future without project conditions unless otherwise noted.

Design: For this alternative the following utilities have a portion of their demands shifted inland and include Riviera Beach, Lake Worth, Lantana, Manalapan, Boca Raton, Hollywood (including Broward County 3B and 3C), Dania, Miramar, Broward County 3A, Hallandale and Florida City. Redistribution of demands for Lake Worth, Lantana, Manalapan, Boca Raton and Florida City are generally consistent with the Lower East Coast Water Supply Plan. For the City of Riviera Beach, demands will be shifted from the eastern facilities to the western facilities with the western facilities absorbing the increased demand between the 1995 and 2050 conditions. For this alternative, the City of Miramar's eastern wellfield will be placed on standby and all demands will be met from the western wellfield. For the City of Hollywood, Hallandale, Dania, Broward County 3A, and Broward County 3B/3C all these wellfields will be placed on standby and the entire demand (with the exception of 4 MGD from the Floridan aquifer for Hollywood) will be met from the South Broward County Regional wellfield. Recharge to the Regional wellfield will be met through the existing canal system supplied from locally captured runoff from the C-9 Basin (Components R and S) and possibly from the North New River ASR system (Component OO).

Location: Lower East Coast Service Area.

Counties: Broward, Dade and Palm Beach.

Assumptions and related considerations:

1) It is assumed that the western facilities of the individual utilities have sufficient capacity to meet the increased demands.

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*C&SF Comprehensive Review Study – Alternative 3*  
Component M3

Geographic Region: Water Preserve Area - Palm Beach County

Component Title: Site 1 Impoundment (Modified from Alternatives 1 and 2 to include Aquifer Storage and Recovery (ASR) and increase pump capacities) – SEE COMPONENT MAP 2

Purpose: Water supply storage reservoir to supplement water deliveries to the Hillsboro Canal during the dry-season.

Operation: The reservoir will be filled during the wet-season from excess water in Hillsboro Canal (backpumped). Water will be released back to Hillsboro Canal to help maintain canal stages during the dry-season. If water is not available in the reservoir, existing rules for water delivery to this region will be applied. Aquifer Storage and Recovery (ASR) is being incorporated to improve efficiency. Five (5) 5 mgd capacity ASR wells will be added (total injection and recovery capacity 25 mgd). Water from the Site 1 Impoundment will be injected when stages in the impoundment are >12.0 feet NGVD (1 foot of depth in the impoundment). Water will be recovered from the ASR wells when stages in the Hillsboro Canal are <7.0 feet NGVD.

Design:

1660 acres with a maximum depth of 6 feet

Inflow pump capacity = 500 cfs

Outflow structure capacity = 200 cfs @ 4 ft. head

Emergency outflow structure = 200 cfs

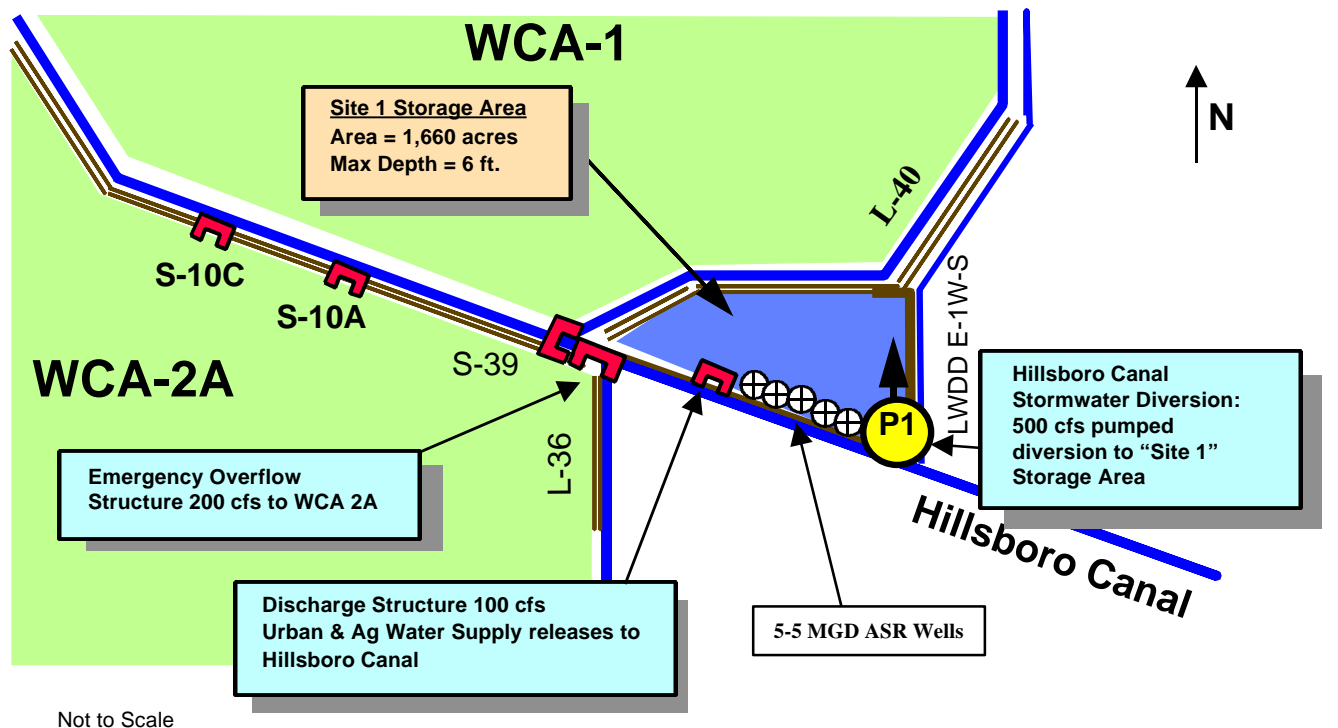
Five (5) – 5 mgd ASR wells (total capacity 25 mgd)

Location: The Water Preserve Area Land Suitability Analysis previously identified 1660 acre site.

Counties: Palm Beach

Assumptions and related considerations:

(1) Excess storage could be discharged to Water Conservation Area 2A if a treatment facility could be added to meet Everglades' water quality standards.



**Alternative 3  
Site 1 Impoundment  
Component Map 2**

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*C&SF Comprehensive Review Study – Alternative 3*  
Component N2

Geographic Region: Water Preserve Area - Broward County

Component Title: Water Conservation Area 2B Levee Seepage Management  
(Same as Alternative 2) -- SEE COMPONENT MAP 3

Purpose: Seasonal seepage management along the eastern edge of Water Conservation Area 2B to reduce losses due to levee seepage to the Lower East Coast.

Operation: Reduction in levee seepage flow from Water Conservation Area 2B to the coastal area during the wet season (June-October) by pumping North New River south. (See Component P.)

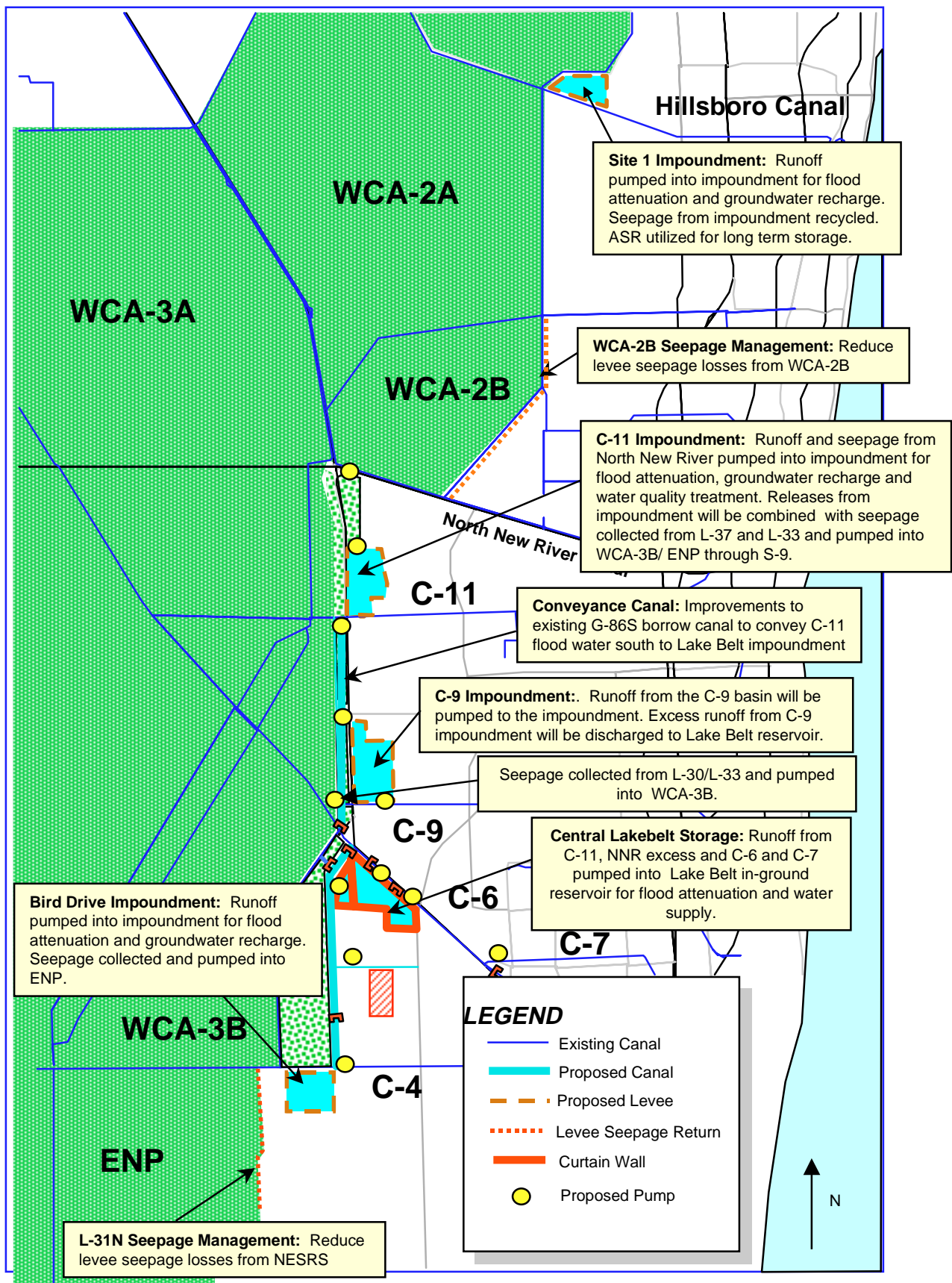
Design: Capture all levee seepage from L-35A borrow canal along Water Conservation Area 2B between S-124 to S-38A. Open S-124 during the wet season to pump all seepage south through Component P. During dry season close S-124 and only pump North New River.

Location: Along the existing eastern protective levee adjacent to Water Conservation Area 2B.

Counties: Broward

Assumptions and related considerations:

- (1) Seepage from Water Conservation Area 2B into North New River is addressed by North New River Water Preserve Area component.
- (2) Additional water retained in the regional system will be used to restore hydropatterns and water supply to the Lower East Coast.



Not to scale

# **General Water Preserve Area Components** **Alternative 3** **Component Map 3**

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*C&SF Comprehensive Review Study – Alternative 3*  
Component O1

Geographic Region: Water Preserve Area - Broward County

Component Title: Water Conservation Area 3A and 3B Levee Seepage Management (Same as Alternatives 1 and 2) – SEE COMPONENT MAP 4

Purpose: Reduce seepage from Water Conservation Areas 3A and 3B to improve hydropatterns within the Conservation Areas by utilizing the marsh areas that are located east of the Water Conservation Areas and west of U.S. Highway 27. Allow higher water levels and longer inundation durations within those marshes. Seepage from the marshes will be collected and returned to the Water Conservation Areas to maintain flood protection. Serves to separate Water Conservation Area 3A seepage water from urban runoff originating in the C-11 Basin.

Operation: Seepage collected in the L-37 and L-33 borrow canals will continue to be backpumped through the existing S-9 pumping station. Seepage from the marsh areas will also be routed through the existing S-9 pumping station. Inflows from other sources will be diverted to storage.

Design: New levees will be constructed west of U.S. Highway 27 from the C-11 Canal to the C-6 Canal to separate seepage water from the urban runoff in the C-11 diversion canal (Component Q). Allow higher water levels in the marshes east of the Water Conservation Areas. A divide structure will be added to the C-11 canal west of Highway 27 to prevent drainage in the C-11 canal to be backpumped into Water Conservation Area 3A through the S-9 pumping station. Water from C-11 west will be diverted to the Central Lake Belt Storage component.

Location: Seepage collected in borrow canals along the existing eastern protective levee adjacent to Water Conservation Area 3A and 3B. Divide structure located in C-11 canal east of Highway 27.

Counties: Broward

Assumptions and related considerations:

(1) It is assumed that the seepage from the Water Conservation Areas meets water quality standards necessary to achieve ecosystem restoration.

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*C&SF Comprehensive Review Study – Alternative 3*  
Component P2

Geographic Region: Water Preserve Area - Broward County

Component Title: North New River Diversion Canal and Treatment Facility (Same as Alternative 2)– SEE COMPONENT MAP 4

Purpose: Capture excess North New River and Water Conservation Area 2B water to store and treat in western C-11 Basin to be backpumped to Water Conservation Area 3A (1) to restore a portion of water deliveries to Water Conservation Area 3A that are eliminated by segregating the C-11 runoff from levee seepage and (2) to reduce stages above NSM in Water Conservation 2B and (3) to divert water through Water Conservation Area 3A and 3B to North East Shark River Slough. Western C-11 runoff that is presently backpumping untreated runoff into Water Conservation Area 3A will be released into the new canal and diverted to the Central Lake Belt Storage Area (see C-11 Diversion Canal component).

Operation: Western North New River water will be conveyed through a diversion canal adjacent to Highway 27 (east) to a water quality treatment facility north of C-11 for eventual backpumping to the Water Conservation Area 3A through the existing pump station S-9. Quantities from North New River that exceed the treatment facility capacity will be routed around the treatment facility to C-11. Outflows from the treatment facility can begin at 0.5 feet depth and will be made to the L-37 borrow canal and ultimately to Water Conservation Area 3A through S-9.

During the wet season (June through October) operate S-124 to direct eastern Water Conservation Area 2B levee seepage to the North New River to be pumped south (see Component N).

Additionally, operate S-141 to discharge 100 cfs from Water Conservation Area 2B through S-34 to North New River when Water Conservation Area 2B is above NSM levels.

Design:

- (1) 600 cfs diversion canal (east of Highway 27) between North New River and water quality treatment facility
- (2) Intermediate 600 cfs pump station in the diversion canal may be need
- (3) S-9 Water Quality Treatment Area
  - 1600 acres with a maximum depth of 4 feet
  - Inflow structure: 400 cfs pump (to be resized as needed)
  - Outflow structure: Gravity structure with 300 cfs capacity at 4 foot head.
  - Outflow Canal: 400 cfs between treatment area and L-37 borrow canal (under US 27)
- (4) 600 cfs bypass canal and water control structure upstream of C-11
- (5) 100 cfs of S-141's 435 cfs capacity operated to lower stages in Water

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*C&SF Comprehensive Review Study – Alternative 3*

Conservation Area 2B when elevations are above NSM.

Location: The diversion canal is located east of US 27 between North New River Canal and the Water Quality Treatment facility. The Water Preserve Area Land Suitability Analysis identified site for the Water Quality Treatment facility. The site is located north of C-11 just east of US-27.

Counties: Broward



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*C&SF Comprehensive Review Study – Alternative 3*  
Component Q1

Geographic Region: Water Preserve Area - Broward County

Component Title: Western C-11 Diversion Canal -- to Central Lake Belt Storage (same as Alternatives 1 and 2) – SEE COMPONENT MAP 4

Purpose: Divert untreated runoff from western C-11 that is presently discharged into Water Conservation Area 3A and excess flows from the North New River Canal and C-9, to the Central Lake Belt Reservoir.

Operation: All runoff in the western C-11 canal that is presently backpumped into Water Conservation Area 3A will be diverted to the Central Lake Belt Reservoir.

Design:

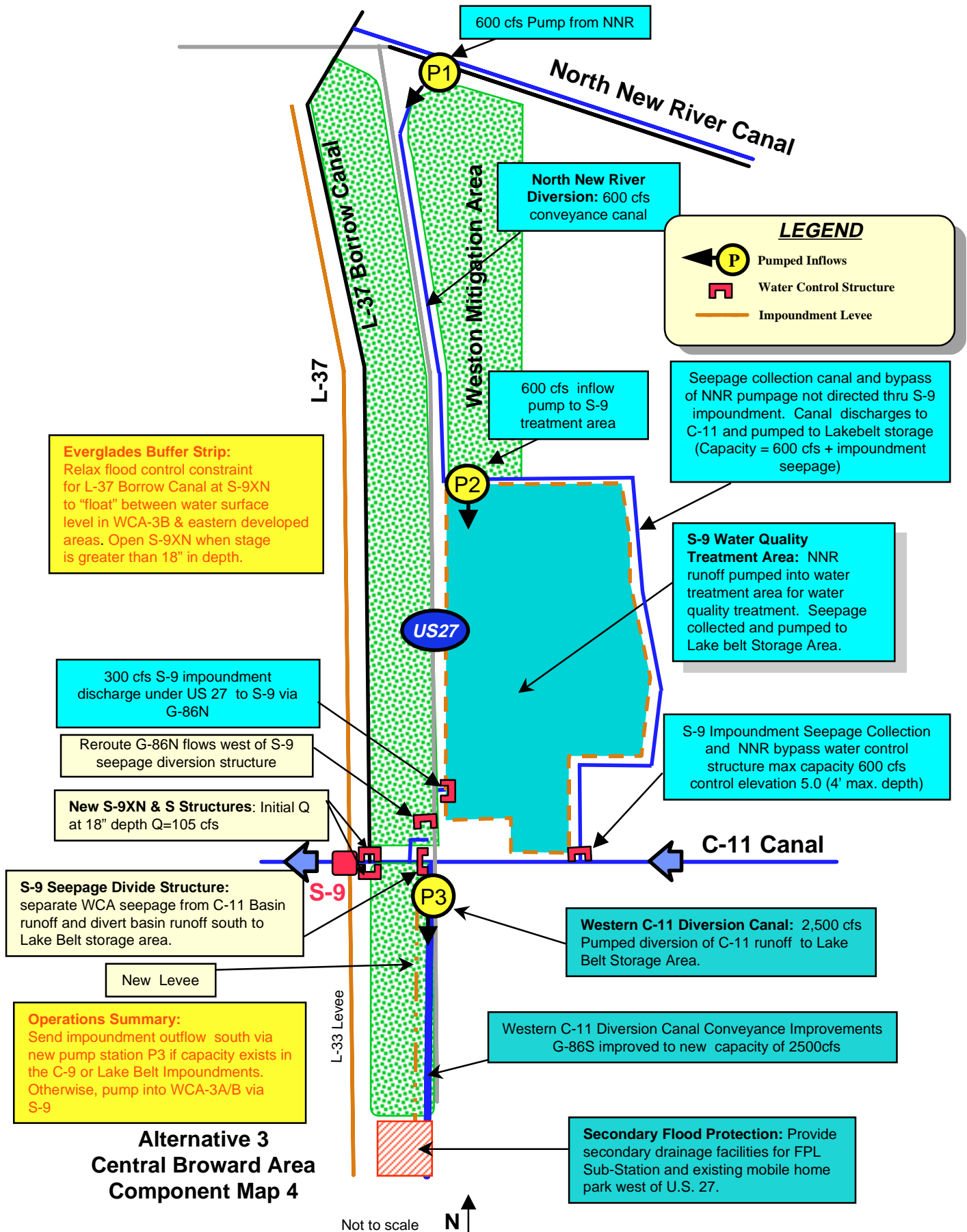
- (1) 2,500 cfs diversion canal west of U.S. 27 between C-11 and C-9 and a 2,500 cfs diversion canal between C-9 and the Central Lake Belt Storage
- (2) Intermediate 2,500 cfs pump station in the diversion canal south of C-11 may be needed

Location: The diversion canal is located west of US-27 between C-11 and the Central Lake Belt Reservoir

Counties: Broward, Dade

Assumptions and related considerations:

- (1) Flood protection component for FPL substation and mobile home park may be needed.



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Component R3

Geographic Region: Water Preserve Area - Broward County

Component Title: C-9 Impoundment (modified from Alternatives 1 and 2.  
Discharges are made to Lakebelt Storage Area, water supply deliveries to C-9  
will come from Lakebelt Storage Area) B SEE COMPONENT MAP 5

Purpose: Capture runoff from western C-9 basin by backpumping into the  
impoundment area. The facility will provide flood peak attenuation within the  
basin, groundwater recharge and seepage control.

Operation: Runoff from western C-9 basin will be backpumped into the  
impoundment area. Excess water up to 500 cfs from the C-9 impoundment will  
be discharged south to the Lakebelt storage reservoir via a new conveyance  
canal. Discharges from the C-9 impoundment will be to the Central Lakebelt  
Storage Area. Outflows to C-9 as needed for water supply purposes will be  
delivered from Central Lakebelt Storage Area. Seepage from C-9 impoundment  
will be collected and returned to the impoundment.

Design:

2,500 acres with a maximum depth of 4 feet

Inflow structure: 1500 cfs pump (to be resized as needed)

Outflow structure (Lake Belt Reservoir): Gravity structure with 500 cfs capacity at  
4 foot head. Discharge C-9 impoundment completely to Lakebelt Storage Area  
(no water held in reserve since it is more effectively stored and utilized there).

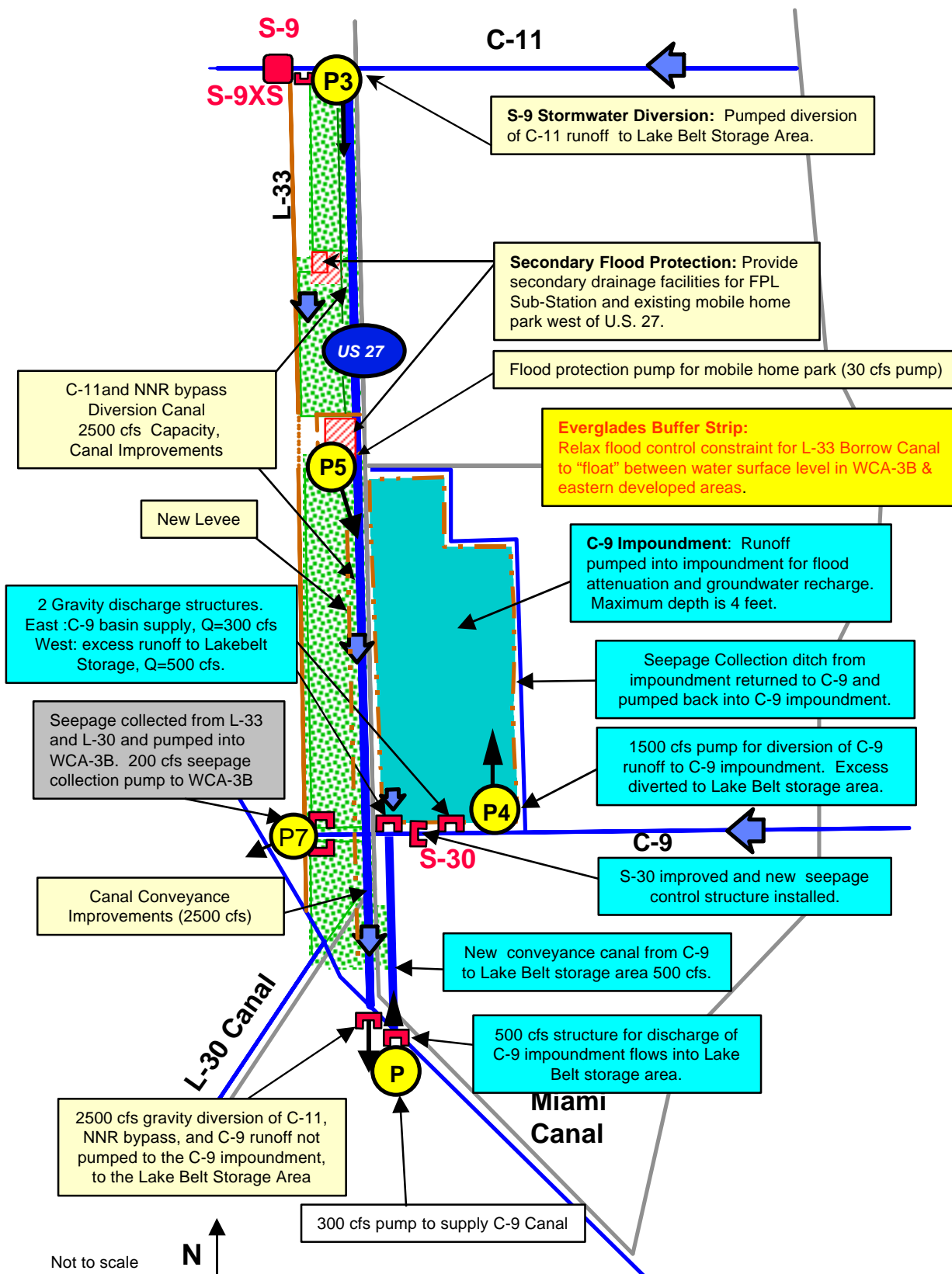
Divide structure assumed between the pump and gravity structure to prevent  
recycling during events when impoundment is discharging to Lakebelt Storage  
Area. This structure must be operated (opened) during water supply deliveries  
from the Lakebelt Storage Area to the C-9 Canal.

Seepage Collection: 200 cfs recycled into the impoundment area

Location: Site identified by Water Preserve Area Land Suitability Analysis  
Counties: Broward

Assumptions and related considerations:

(1) Treatment facility needed if stored water is backpumped into Water  
Conservation Area 3A.



**Alternative 3  
S.W. Broward Area  
Component Map 5**

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component S3

Geographic Region: Water Preserve Area - Dade County

Component Title: Central Lakebelt In-ground Storage Reservoir (Modified from Alternatives 1 and 2. Includes water quality treatment area, reduction in size of in ground reservoir, additional structures and modified operations. ) B SEE COMPONENT MAP 6

Purpose: In-ground reservoir to capture a portion of runoff from western North New River, C-11, C-9, C-6 and C-7 Basins. The in-ground reservoir will allow storage of untreated runoff without concerns of ground water contamination. The stored water will be used to maintain stages during the dry season in the C-9, C-6, Northwest wellfield protection canal, C-4, C-2 and the South Dade Conveyance System Canals.

Operation: Inflows from C-6 (west of the proposed divide structure), western C-11, and portions of runoff from North New River and C-9 basin runoff are both pumped and gravity fed into in-ground reservoir. Inflow ceases when stages reach ~5.0 feet, NGVD (0 feet above adjacent land elevation).

Outflows for water supply are made to South Dade Canal System (via ~400 cfs pump to L-30), Northwest wellfield protection canal (via a ~500 cfs pump), the C-6 Canal (via a 300 cfs pump) and the Dade-Broward Levee canal (via a 100 cfs pump). Supply from the reservoir can be withdrawn for stages down to -7.5 feet NGVD for South Dade Canal System and Dade-Broward Levee. For Snapper Creek Canal (C-2 and C-4 deliveries), C-6 and C-9 Canals can be made down to -20 feet NGVD (up to 25 feet of working storage & maximum head on seepage barrier). Demands met from reservoir outflow via the NW Wellfield Delivery Canal/Snapper Creek Canal and the Dade-Broward Levee canal will be passed through a Stormwater Treatment Area prior to discharge.  
(Note: SFWMM simulation assumes 5120 acres of surface area. To simulate equivalent working storage volumes, the simulated water levels are higher from those prescribed here.)

Design:

Reservoir: 4,000 acres with subterranean seepage barrier around perimeter to enable drawdown during dry periods and to prevent water quality impacts to the northwest Dade wellfield.

Inflow Structures:   2500 cfs gravity structure from North New River and C-11W  
                          500 cfs gravity structure from C-9  
                          300 cfs pump from C-7  
                          600 cfs pump from C-6 west of divide structure

Outflow Structures: 400 cfs pump to L-30 for deliveries to South Dade

**-Draft-**

*C&SF Comprehensive Review Study – Alternative 3*

Conveyance system:

300 cfs pump to C-6

100 cfs pump to Dade Broward Levee to maintain 4.5'NGVD

300 cfs pump to C-9 southern ext. to supply C-9 to prevent saltwater intrusion.

500 cfs pump to NW wellfield protection canal/Snapper Creek (C-2), C-4.

Water supply discharges are routed to C-4/C-2 via Northwest wellfield protection canal system. To route water supply deliveries from the Lakebelt Reservoir or regional system to the wellfield protection canal and to C-2/C-4 the capacities of several structures were increased as follows:

1.) L-30 to Northwest wellfield protection canal from 200 to 600 cfs @0.5 ft. head

2.) Northwest wellfield lateral canal (Snapper Creek extension) from 300 to 900 cfs @ 0.5 ft head

3.) Snapper Creek extension to C-2/C-4 300 cfs @0.5 ft. head (no change).

(Note: structures may be re-sized as determined via more detailed analyses.)

Stormwater Treatment Area: 1200 Acres for treatment of Total Phosphorus from 50 to 40 ppb. (Stormwater Treatment Area detention time requirements need to be addressed. Pretreatment in reservoir may reduce size requirements of treatment area).

Location: Reservoir would be within the area proposed for rock mining by the Lakebelt Issue Team. It would be sited south of Miami Canal (C-6) and North of the NW wellfield delivery canal to minimize impacts to the wellfield and between Pennsuco wetlands and Snapper Creek.

Counties: Dade

Assumptions and related considerations:

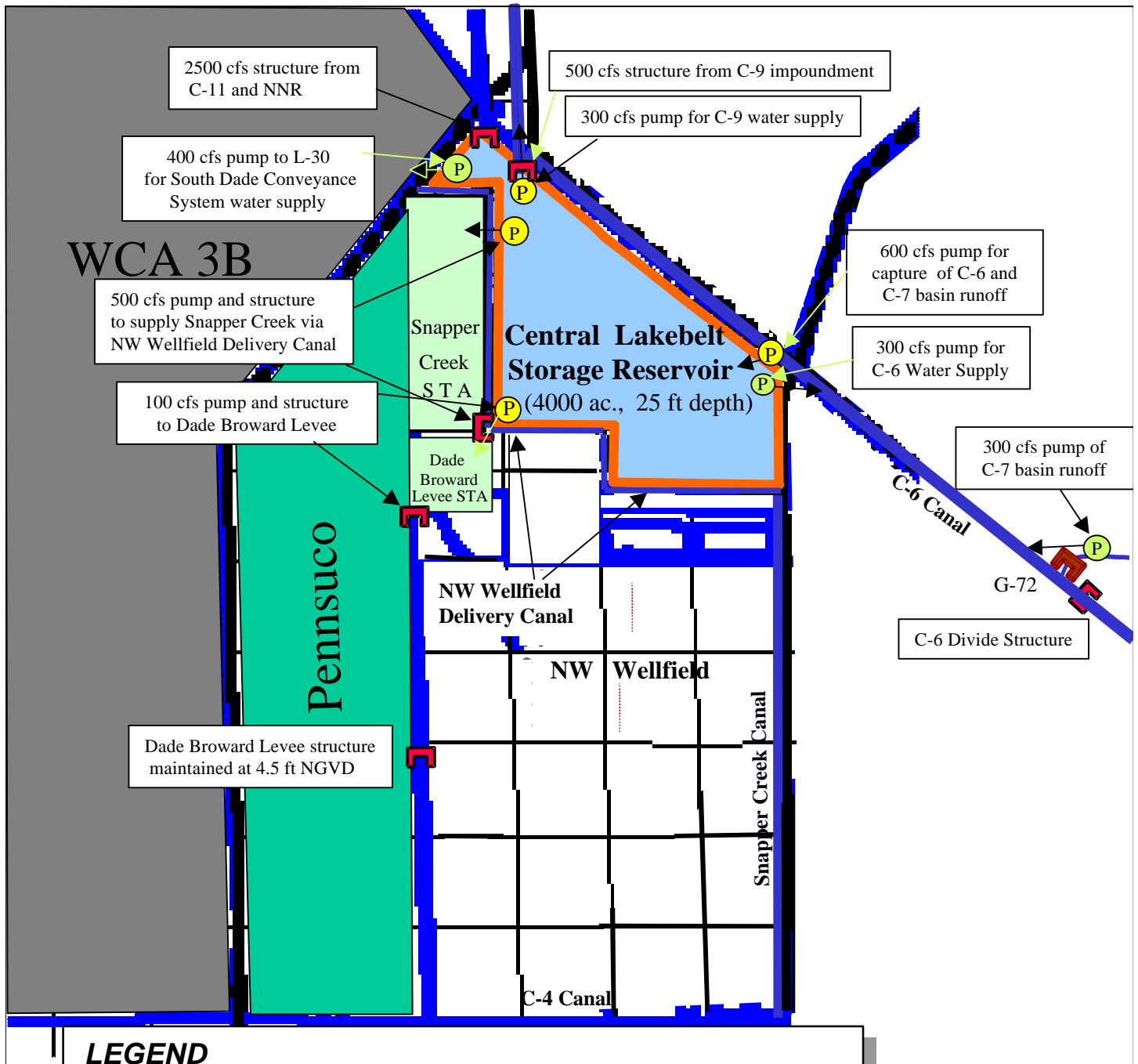
(1) No adverse effect of a subterranean wall on Dade County's NW wellfield

(2) Treatment facility needed if stored water is backpumped to the Everglades.

(3) All water quality considerations will be addressed regarding releases from the reservoir to the water supply wellfields.

(4) Impacts on the cone of influence of the Northwest Wellfield and its effect on wetland mitigation around the wellfield.

(5) Limestone Filter Treatment system within the Reservoir may be developed through use of compartmentalization of rockmining excavation pattern



### LEGEND

- |  |   |  |
|--|---|--|
|  Existing Canal |  Proposed Structure    |  Existing Structure |
|  Proposed Canal |  Proposed Pump         |  Existing Pump      |
|  Proposed Levee |  Levee Seepage Control |  Curtain Wall      |

**Alternative 3**  
**Central Lakebelt Storage**  
**Component Map 6**

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*

Component T1

Geographic Region: Water Preserve Area – Dade County

Component Title: C-4 Structure (Same as Alternatives 1 and 2).

Purpose: Proposed structure would control water levels in the C-4 Canal at higher elevation to reduce seepage losses from the Pennsuco Wetlands and areas to the west of the structure located just downstream of the Dade-Broward Levee on C-4.

Operation: The structure would maintain water levels at 6.5 feet NGVD for seepage control purposes and be capable of passing flood flows with a minimum of head loss and supplying water to the C-4 basin to meet demands.

Design: Operable Lift-gate with 6.5 feet NGVD overflow and approximately 400 cfs capacity (final design specifications will be determined in detailed design and hydrologic and hydraulic modeling in the future).

Location: Just downstream of the Dade-Broward Levee on C-4 Canal.

Assumptions and related considerations:

- (1) Benefits to WCA-3B associated with improved C-4 seepage control are directly related to the proposed G-356 pumpage (Modified Water Deliveries).
- (2) Head losses across the Proposed Structure will not inhibit passing flood releases when necessary.
- (3) A pump may be associated with this structure if back pumping the C-4 basin runoff to the Bird Drive storage area becomes a component of the final alternative.



**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component U3

Geographic Region: Water Preserve Area - Dade County

Component Title: Bird Drive Basin Impoundment (Modified from Alternative 2 for enhanced seepage collection) -- SEE COMPONENT MAP 7

Purpose: Capture runoff from western C-4 basin and induce seepage collection/treatment of Bird Drive water through pumping seepage collection canal to L-31N. The facility will provide C-4 flood peak attenuation within the basin and provide water to L-31N available to be pumped west through the proposed S-356 A and B pumps (see Component FF3) and enhance groundwater recharge.

Operation: Inflows from western C-4 basin to be pumped into proposed impoundment area to provide flood peak attenuation and groundwater recharge and to provide water to L-31N to be pumped west through the proposed S-356 A and B pumps (see Component FF). C-4 runoff in excess of 600 cfs pump capacity to be discharged eastward. Outflows will be used to meet C-4 needs when available.

The modification to this component is the seepage collection canal will be pumped down to 5.0 feet NGVD and discharged to L-31N and pumped to Northeast Shark River Slough via S-356A and B. This will make available more runoff from the Bird Drive impoundment.

The C-4 downstream diversion structure shall be closed in the dry season except to allow regional water to be brought in to maintain S-25B. During the wet season the structure should be opened but also allow for capture of western C-4 basin water by the reservoir and diversion of excess through the C-2 canal.

Design:

2,877 acres with a maximum depth of 4 feet

Inflow structure: 600 cfs pump (to be resized as needed)

Outflow structure:

Water supply: Gravity structure with 200 cfs capacity at 2 foot head.

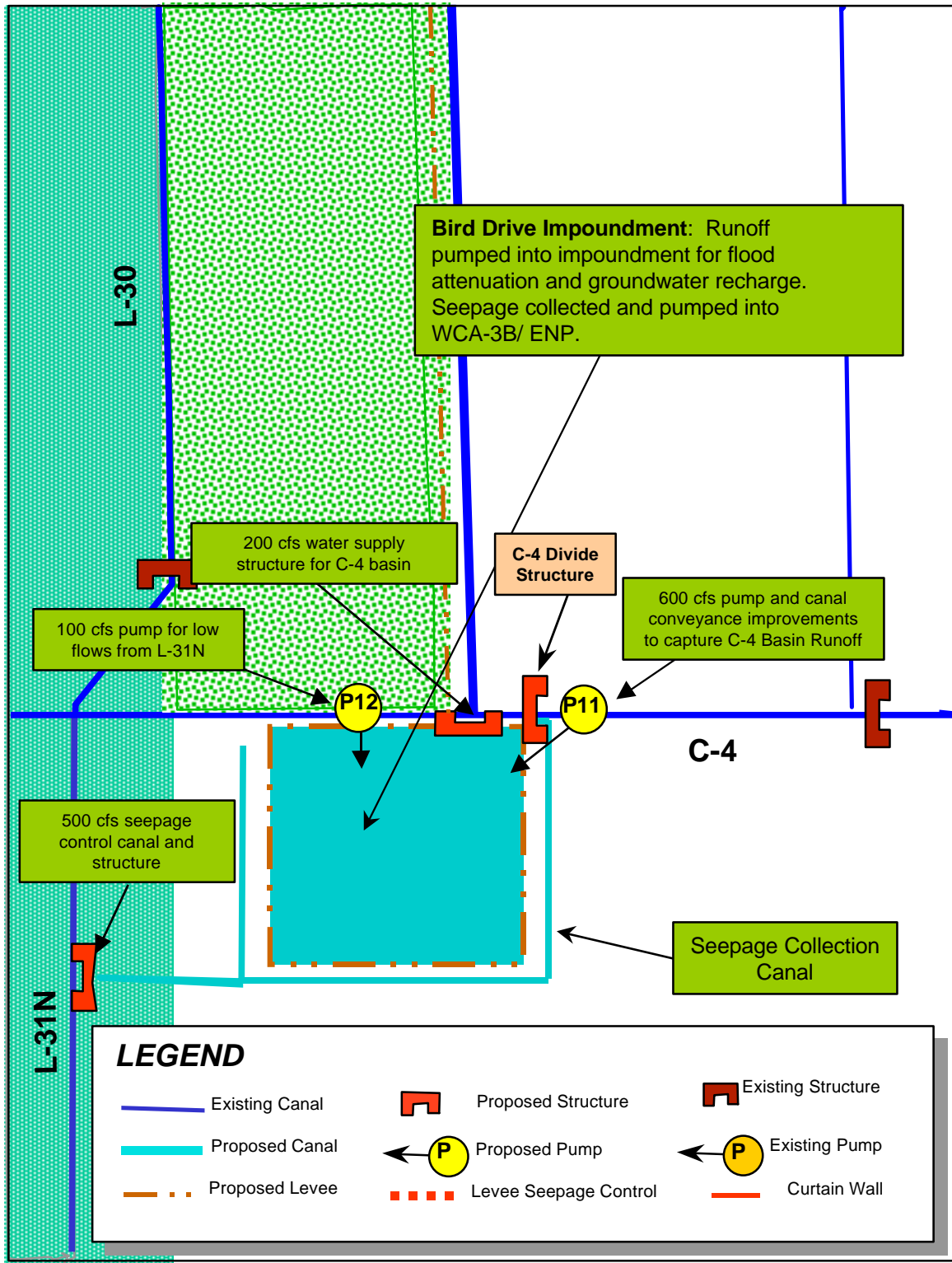
Seepage Collection System: 500 cfs pump to control seepage collection canal at 5.0' NGVD. Pump to L-31N.

Location: Northwestern 4 sections in Bird Drive basin. This site was identified during the Water Preserve Area Land Suitability Analysis.

Counties: Dade

Assumptions and related considerations:

(1) Treatment facility needed if seepage collected does not meet Everglades standards.



**Alternative 3**  
**Bird Drive Basin**  
**Component Map 7**

Not to Scale



**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component V2

Geographic Region: Water Preserve Area - Dade County

Component Title: L-31N Levee Improvements for Seepage Management (Same as Alternative 2) – SEE COMPONENT MAP 7

Purpose: Levee seepage management along the eastern edge (L-31N) of Everglades National Park to eliminate losses due to levee seepage to the East Coast. An additional feature has been added to reduce all wet-season seepage/ground water flows to the east. Feature will help restore hydro patterns in Everglades National Park.

Operation: 100% reduction in levee seepage flow from Everglades National Park year-round. Further 100% reduction in all groundwater flows during the wet-season. Bird Drive Basin and Lakebelt storage facility will be used to recharge aquifers to the east.

Design:

Levee Seepage: Sheet pile or coring material will penetrate the L-31N levee and a portion of the aquifer to retard seepage between Tamiami Trail to the 8.5 square mile area.

Wet-Season Ground Water Seepage: Distributed ground water wells adjacent to L-31N and return flows to Everglades National Park.

If needed, aquifer recharge will occur from deliveries from Bird Drive Basin and Lakebelt storage facilities.

Location: Along the existing eastern protective levee (L-31N) adjacent to Everglades National Park.

Counties: Dade

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component W2

Geographic Region: Taylor Creek/Nubbin Slough

Component Title: Taylor Creek/Nubbin Slough Storage and Treatment Area  
(Same as Alternative 2)

Purpose: Storage reservoir to provide flood protection, water quality treatment, estuary protection and water supply benefits.

Operation: Local runoff from the Taylor Creek/Nubbin Slough basins to be pumped into a 5,000-acre reservoir and then into a 5,000-acre stormwater treatment area. The stormwater treatment area will reduce phosphorus concentrations in the runoff from approximately 0.528 mg/l to 0.107 mg/l. Treated water will then be pumped into Lake Okeechobee when the lake stage is falling and is at least 0.5 feet below the bottom pulse release zone.

Design:

Storage Reservoir:

5,000-acres at 10 feet maximum depth

Inflow pump capacity 2,500 cfs

Outflow pump capacity 1,000 cfs

Stormwater Treatment Area:

5,000-acres at 4 feet maximum depth

Inflow pump capacity 1,000 cfs (same structure as reservoir outflow)

Outflow pump capacity 1,000 cfs

Location:

Counties: Okeechobee, St. Lucie

Assumptions and related considerations:

- (1) Uncertainty in land availability.
- (2) Potential increase in stage duration of Lake Okeechobee.
- (3) Potential decrease in maximum stages of Lake Okeechobee.
- (4) Phosphorus inflow concentrations (flow-weighted) for the Taylor Creek (S-191) and Nubbin Slough (S-133) Basins obtained from 5-year rolling averages (1991-1995).
- (5) Average annual discharge rates determined from the period of record 1965-1990.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component X3

Geographic Region: Water Preserve Area – Palm Beach County

Component Title: C-17 Backpumping (same as Alternative 2 except for delivery route change and increase of stormwater treatment area size) – SEE COMPONENT MAP 8

Purpose: Reduce water supply restrictions in Northern Palm Beach County Service Area by providing additional flows from the C-17 Basin to the West Palm Beach Water Catchment Area and enhance hydroperiods in the Loxahatchee Slough.

Operation: Capture excess C-17 Canal water to meet urban water supply demands in North Palm Beach Service Area. Water would be diverted through a canal proposed in the FPL right-of-way to a stormwater treatment area and ultimately to the West Palm Beach Water Catchment Area.

Design: 350 cfs pump on the C-17 Canal at its intersection with the FPL right-of-way

300 cfs pump in the proposed canal west of Haverhill Road to push flows southwest to the proposed stormwater treatment area

Culverts under Village Blvd., Military Trail, 45<sup>th</sup> Street, Haverhill Road and Florida's Turnpike

550 acre stormwater treatment area at 4 feet maximum depth

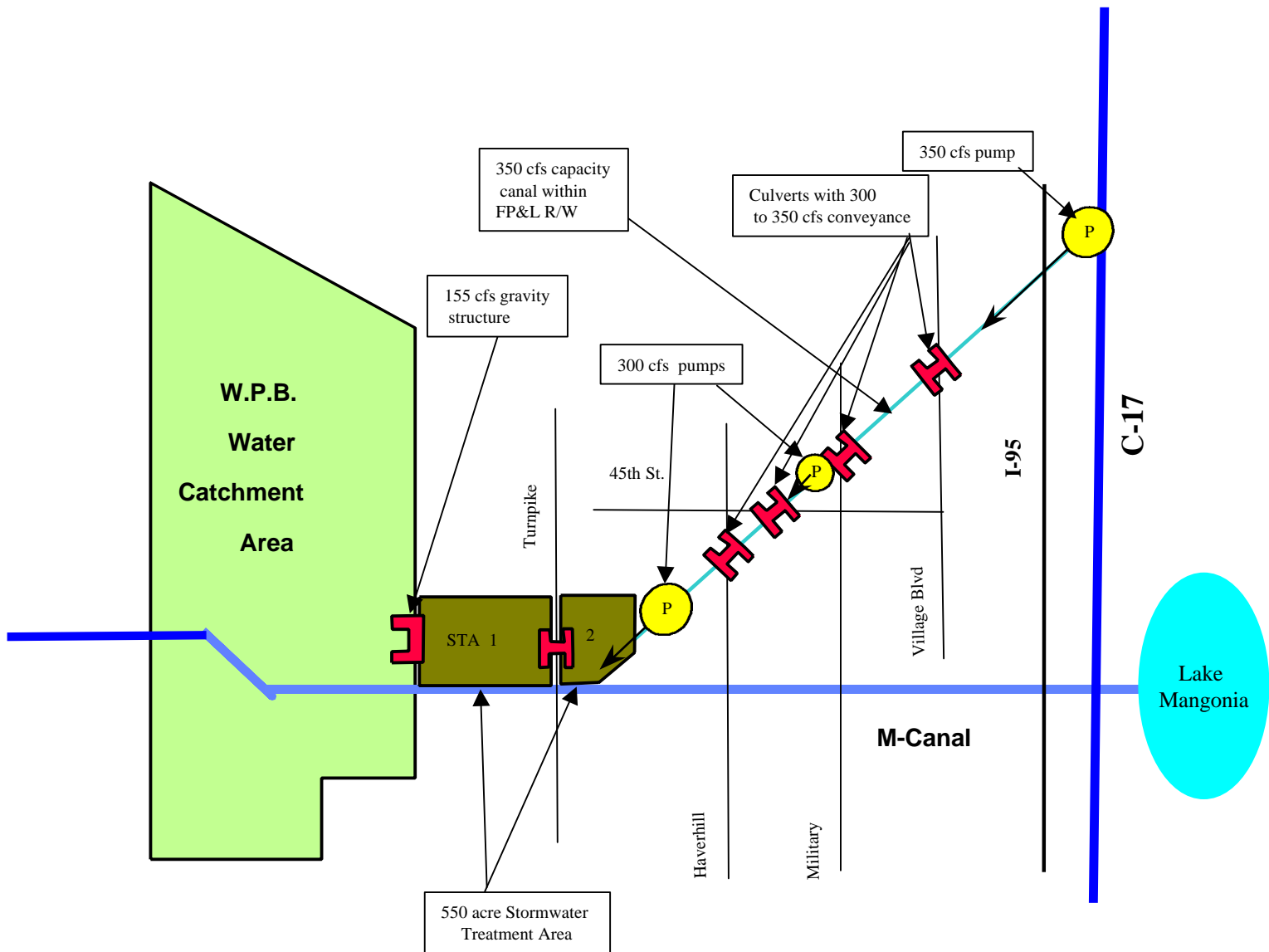
300 cfs pump into the proposed stormwater treatment area

155 cfs gravity discharge structure into West Palm Beach Water Catchment Area

Location: 550 acres located east of the West Palm Beach Water Catchment Area.  
Counties: Palm Beach

Assumptions and related considerations:

- (1) Water quality of C-17 water similar to C-51 water quality
- (2) Location of stormwater treatment area south of existing landfill
- (3) Unconstrained canal size within FPL right-of-way



### LEGEND

Existing Canal



Proposed Structure



Proposed Culvert

Proposed Canal



Proposed Pump



Existing Pump



Not to scale

Alternative 3  
C-17  
Component Map 8

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component Y3

Geographic Region: Water Catchment Area – Palm Beach County

Component Title: C-51 Backpumping to Water Catchment Area (same as Alternative 2 except for the reduction of stormwater treatment area size) – SEE COMPONENT MAP 9

Purpose: Reduce water supply restrictions in Northern Palm Beach County Service Area by providing additional flows from the C-51 West Basin to the West Palm Beach Water Catchment Area and enhance hydroperiods in Loxahatchee Slough.

Operation: Capture excess C-51 Canal water to meet urban water supply demands in the North Palm Beach County Service Area. Water would be diverted from C-51 to a water treatment area and then into the Water Catchment Area.

Design: 600 acres at 4 feet maximum depth to be used for stormwater treatment. Relocate the S-155A structure east of the intersection of Lake Worth Drainage District's E-1 Canal and the C-51 Canal and increase the capacity of S-155A from 1000 cfs to 1450 cfs.

Improve conveyance between C-51 and the stormwater treatment area as necessary.

450 cfs inflow pump to stormwater treatment area.

185 cfs gravity discharge structure into West Palm Beach Water Catchment Area.

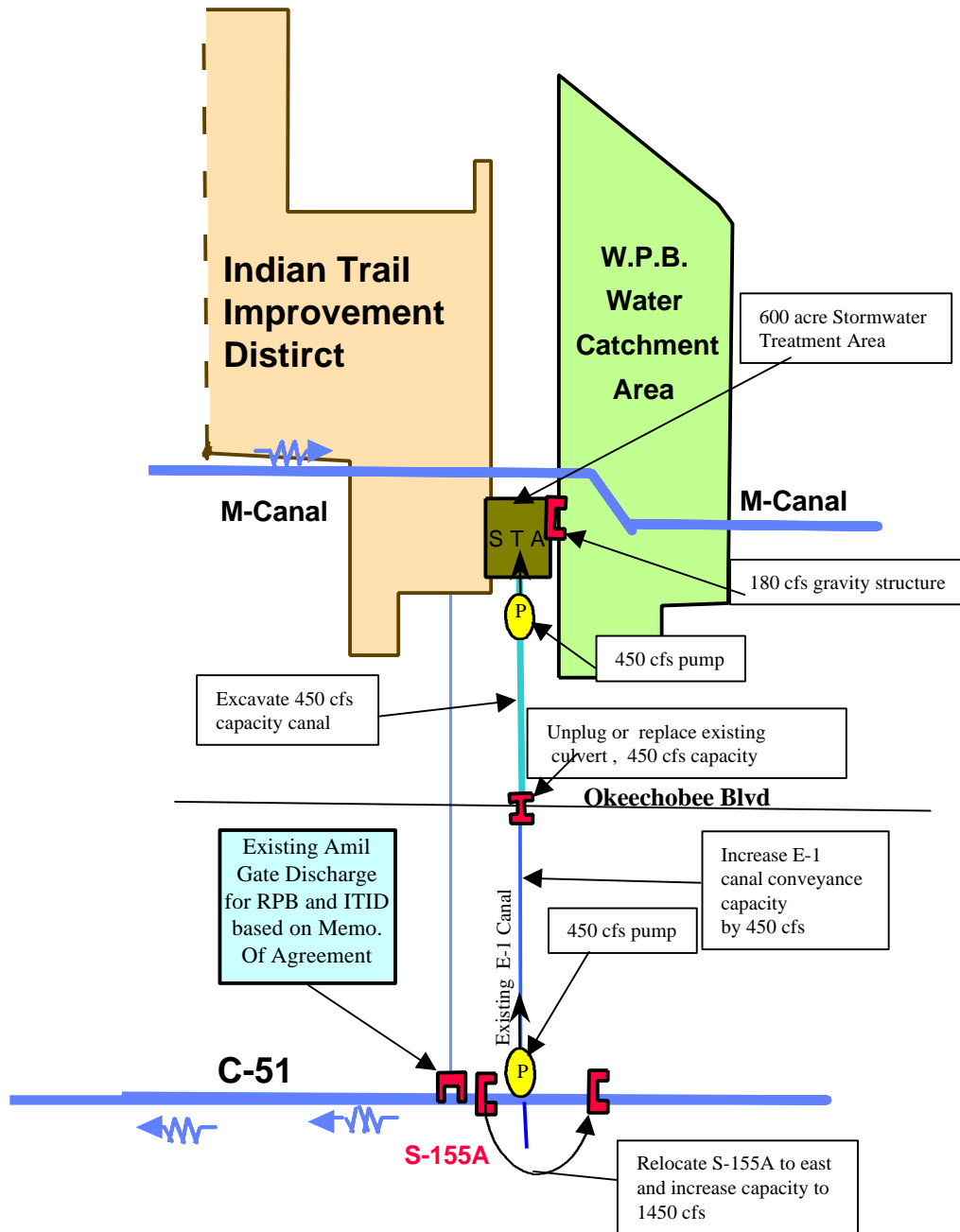
Location: 600 acres located southeast of West Palm Beach Water Catchment Area.

Counties: Palm Beach







Assumptions and related considerations:

(1) Uncertainty in land availability.

(2) Connection of L-8 and C-51 Basins.



### LEGEND

	Existing Canal		Proposed Structure		Existing Structure
	Proposed Canal		Proposed Pump		Culvert

N



Not to scale

## Alternative 3 C-51 East Component Map 9



**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component AA3

Geographic Region: Central and Southern Everglades, Water Conservation Areas and Everglades National Park

Component Title: Additional S-345 structures (same as Alternative 2 with the exception of relocating the structures further south to relieve high water conditions in northern WCA-3B).

Purpose: The compartmentalization of the Water Conservation Areas has contributed to the loss of historic overland flows of the central Everglades slough system. This alteration of flows has resulted in temporal changes in hydropatterns and hydroperiods in the historic deepwater, central axis of the Shark Slough system. This component adds conveyance to Water Conservation Area 3B to help in re-establishing NSM-like hydroperiods and hydropatterns and the historical flow distribution across Tamiami Trail.

Operation: The addition of a North East Shark River Slough rainfall trigger well and modification of western Shark Slough basin rainfall triggers deliver additional flows to the basin. Modification of L-67A decreases downstream conveyance to the S-12's required to promote surface water flows to Water Conservation Area 3B and to North East Shark River Slough.

Design: Triple the total discharge capacity of S-345's to 4500 cfs and the addition of associated plugs (S-349's).

Location: The additional structures and plugs are to be spaced evenly along the southern half of L-67A.

Assumptions and related concerns: The emphasis is in re-establishing the historic persistent, deep-water slough that existed in Water Conservation Area 3B and North East Shark River Slough.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component BB3

Geographic Region: Water Preserve Area - Palm Beach County

Component Title: Dade Broward Levee / Pennsuco Wetlands (Same as Alternatives 1 and 2) -- SEE COMPONENT MAP 6

Purpose: Reduce seepage to the east from the Pennsuco wetlands and southern Water Conservation Area-3B and enhance hydroperiods in the Pennsuco. Also an improved Dade Broward Levee will enhance recharge Dade County's NW wellfield

Operation: Improvements to the Dade-Broward Levee and associated conveyance system will reduce seepage losses to the east and provide recharge to Dade County's Northwest Wellfield. Seepage reduction will enhance hydroperiods in Pennsuco wetlands and hold stage higher along southeastern WCA-3B. Recharging the conveyance features of the Dade-Broward levee from the Central Lakebelt In-ground Storage Reservoir (see component S1) provides recharge to Dade County's Northwest Wellfield. Treatment areas will be provided to meet all water quality standards required for release from the Central Lakebelt Reservoir if necessary.

Design:

Improve the Dade-Broward Levee:

- Construct or improve existing levee to five-foot height with 2-foot top width while creating or improving existing conveyance to a capacity of up to 300 cfs.
- Provide recharge for the Dade-Broward Levee conveyance system from the Central Lakebelt In-ground Storage Area when the Conveyance Channel is below 4.5 feet NGVD at the C-4 structure located at the southern end of the Dade-Broward Levee.

Location: Dade-Broward Levee, Pennsuco Wetlands, WCA-3B, the Central Lakebelt Reservoir and Dade County's Northwest Wellfield.

Counties: Dade

Assumptions and related considerations:

- (1) Wellfield protection must be maintain through recharge of acceptable water quality.
- (2) Stormwater Treatment Area of the recharge provided from the Central Lakebelt Storage Reservoir may be needed.
- (3) Secondary structures within the recharge canals may be needed to provide seepage reduction and wellfield recharge desired.
- (4) The stage maintained in the Dade-Broward Levee conveyance is subject to change.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*

Component CC3

Geographic Region: Lower East Coast Service Area

Component Title: Broward County Secondary Canal System (Modified from Alternative 2 to include additional canal and pump facilities) – SEE COMPONENT MAP 10

Purpose: Increase pump capacity of existing facilities (from the 2050 Base Case) for the Broward County Secondary Canal System to provide additional recharge to wellfields located in central coastal Broward County. Construct additional canal and pump facilities to provide additional benefit. Facilities are designed for water supply benefits and capture of excessive storm water discharges to tide.

Operation: When excess water is available in the basin, water is pumped into the coastal canal systems to maintain canal stages. When local water is not sufficient to maintain canal stages, canal stages are maintained first from local sources and then from the regional system. Local sources include the Site 1 Impoundment (Component M), Hillsboro Canal ASR (Component NN) and the North New River ASR (Component OO).

Design:

Canal Conveyance: Improve canal conveyance of secondary canal located east of the Florida Turnpike (herein referred to as the east turnpike canal) from the C-12 canal south to the Fort Lauderdale Golf and Country club. Canal Conveyance improvements may also be necessary for Old Plantations Water Control District's eastern canal.

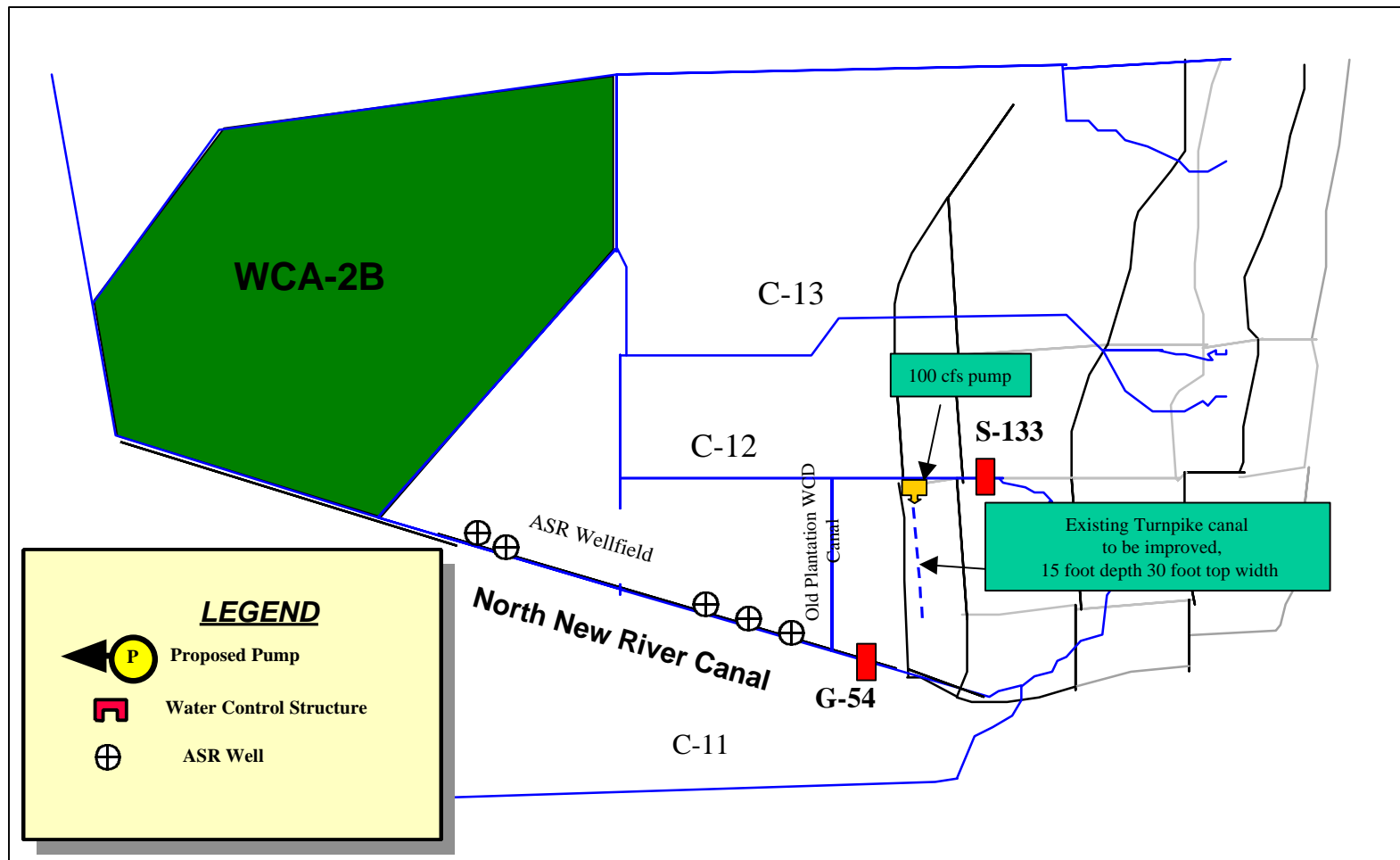
Canal pump Capacities and maintenance levels: Increase pump capacities in the Broward Secondary Canal System for pumps P-2 and P-3 from the existing 33 cfs to 100 cfs. Add an additional 100 cfs pump on the east turnpike canal withdrawing from the C-12 canal. Maintenance level for the canals shall be the same as specified in the Lower East Coast Water Supply Plan. The east turnpike canal shall be maintained at a level similar to the North New River.

Location: Lower East Coast Service Area.

Counties: Broward.

Assumptions and related considerations:

(1) Canal levels are maintained from local basin runoff and local sources. When water is not available from local sources, water is supplied to the canal systems from the regional system.



**Alternative 3**  
**Broward County Secondary Canal System and**  
**North New River Canal Aquifer Storage and Recovery**  
**Component Map 10**

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*

Component DD3

Geographic Region: Holey Land Wildlife Management Area

Component Title: Revised Holey Land Operational Plan (modified from Alternative 2 to be based on rain-driven operations)

Purpose: Improve timing and location of water depths within the Holey Land Wildlife Management Area based on rain-driven operations.

Operation: Rainfall-driven operational rules with NSM-like hydrologic conditions triggering deliveries. Rainfall-driven inflows are driven by NSM water depths in cell R45C18. Outflows are based on NSM water depths in R42C20.

Design: Operational change only.

Location: Southern portion of the Everglades Agricultural Area, north of Water Conservation Area 3A.

Counties: Palm Beach

Assumptions and related considerations:

1) Water deliveries made to the Holey Land through G-200A are assumed to be of acceptable water quality from either Rotenberger or Lake Okeechobee.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component EE3

Geographic Region: Rotenberger

Component Title: Modified Rotenberger Regulation Schedule

Purpose: Improve timing and location of water depths within the Rotenberger Wildlife Management Area based on rain-driven operations.

Operation: Rainfall-driven operational rules with NSM-like hydrologic conditions triggering deliveries. Rainfall-driven inflows and outflows are driven by the average of NSM water depths in cells R46C15 and R43C15.

Design: Operational change only.

Location: Southern portion of the Everglades Agricultural Area, north of Water Conservation Area 3A.

Counties: Palm Beach

Assumptions and related considerations:

1) Water deliveries made to Rotenberger from Stormwater Treatment Area 5 are assumed to be of acceptable water quality

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component FF3

Geographic Region: South Dade

Component Title: Construction of S-356 A & B Structures – SEE COMPONENT MAP 11

Purpose: To improve deliveries to Northeast Shark River Slough in Everglades National Park and reduce seepage to Lower East Coast Service Area 3.

Operation: S-356 A & B begin pumping when L-31N Canal stage exceeds 6.0 ft NGVD and stops pumping when stages fall below 5.5 ft NGVD.

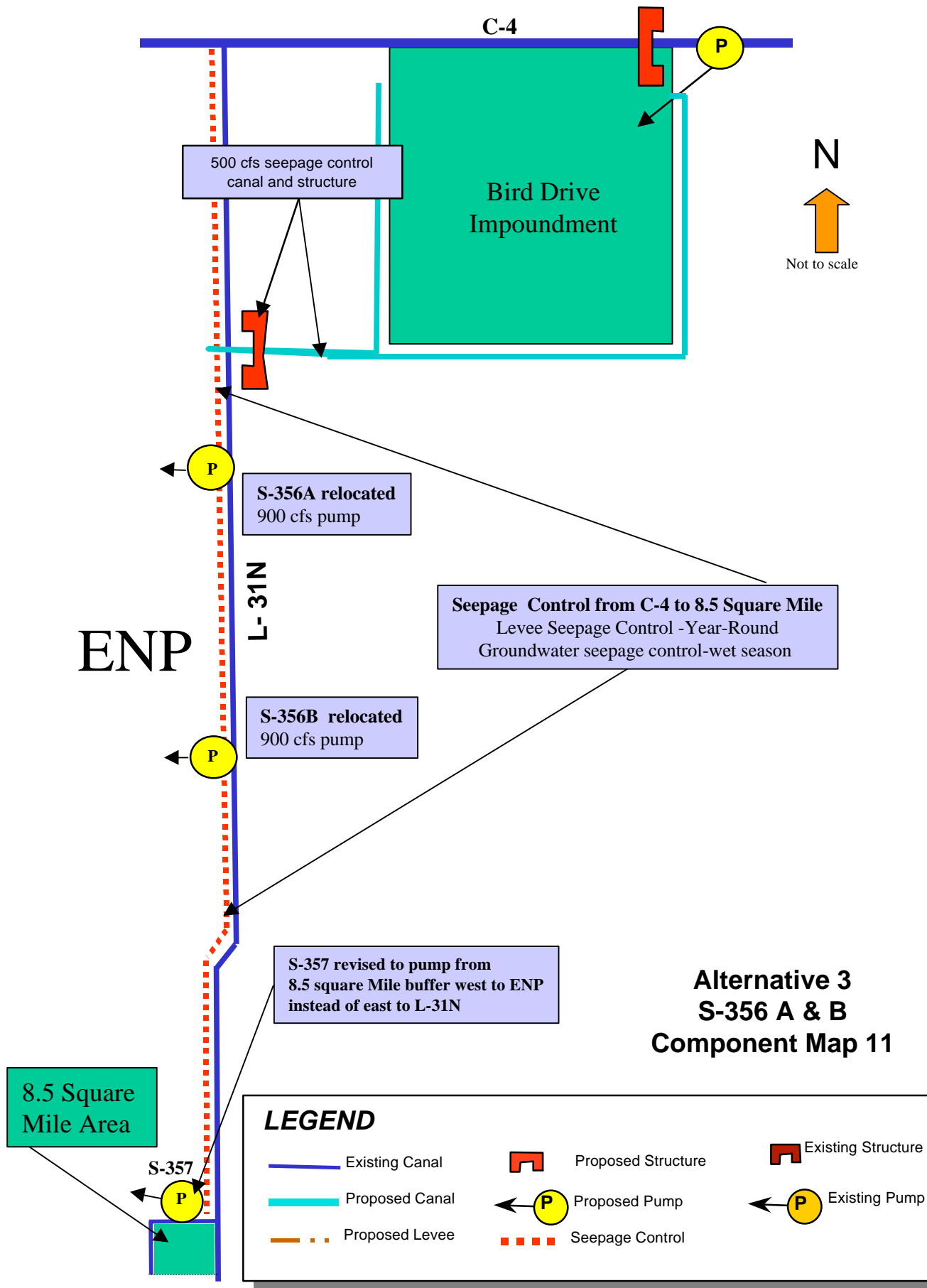
Associated Features: Redirect Bird Drive Basin Impoundment flow to L-31N instead of L-29. Redirect S-357 outfall from L-31N to the mid-point of the Modified Water Deliveries mitigation canal northwest of the 8.5 Square Mile Area.

Design:        Remove Modified Water Deliveries S-356  
                 Relocate Modified Water Deliveries S-357  
                 Add S-356 A & B Structures (900 cfs each) at locations along  
                 L-31N between G-211 and Tamiami Trail

Location: L-31N along east side of Northeast Shark River Slough  
Counties: Dade

Assumptions and related considerations:

- (1) Water Quality is not a problem
- (2) Bird Drive Basin Impoundment flows are redirected seepage.
- (3) No adverse impacts to areas east of L-31N.
- (4) S-356 A & B to be resized (reduced) as needed. Initially assumed large to not constrain performance.





**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component GG3

Geographic Region: Lake Okeechobee

Component Title: Lake Okeechobee Aquifer Storage and Recovery (Lake ASR) –  
SEE COMPONENT FIGURE 1.

Purpose:      Provides additional regional storage while reducing both evapotranspiration losses and the amount of land removed from current land use (e.g. agriculture) that would normally be associated with construction and operation of above-ground storage facilities (reservoirs);  
                 Increase the Lake's water storage capability to better meet regional water supply demands for agriculture, Lower East Coast urban areas, and the Everglades;  
                 Manage a portion of regulatory releases from the Lake primarily to improve Everglades hydropatterns, meet environmental targets within the Water Conservation Areas (WCAs), and meet supplemental water supply demands of the Lower East Coast;  
                 Reduce harmful regulatory discharges to the St. Lucie and Caloosahatchee estuaries;  
                 Maintain existing level of flood protection.

Operation: This option utilizes Lake Okeechobee as its source of water. Water injected into the Lake Aquifer Storage and Recovery wells will commence when the Lake stage rises above the ASR injection line (1.0 ft below the level 1 pulse release zone of the Lake Okeechobee Regulation Schedule). Water recovered from the ASR wells would be backpumped into the Lake when the Lake stage falls below the ASR recovery line (see Figure 1) which is 13.0 ft NGVD between January and June, and is approximately 0.5 ft above the water supply restriction zone between August and December.

Design: 1,000 MGD total: 100 10-MGD ASR wells and associated infrastructure

Location: Lake Okeechobee peripheral levee

Assumptions and Related Considerations:

(1) Current United States Environmental Protection Agency (USEPA) and Florida Department of Environmental Protection (FDEP) regulations require that ASR source water meet primary drinking water standards before injection. Lake Okeechobee water is assumed to meet these standards.

(2) ASRs will have an approximate recovery rate of 70%, i.e. 30% of water injected to the deep wells is lost due to transmission (injection and recovery) and storage (mixing with deep aquifer saline water, migration of ASR storage flume) losses.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component HH3

Geographic Region: Central and Southern Everglades, Water Conservation Areas and Everglades National Park

Component Title: Operation Change of S-343 A and B

Purpose: Releases from the southwest corner of Water Conservation Area 3A contributes to the flow in a nesting region of the Cape Sable Sparrow. In order to reduce the potential adverse effects on the nesting season, the S-343 A and B structures will be closed during the January to June time period.

Operation: The new schedule will include releases to achieve NSM water depths except during the months of January to June when the releases are suspended. The suspension of releases will help provide a recession of downstream stages during the nesting season.

Design: No change.

Location: No change.

Assumptions and related concerns: ATLSS outputs from Alternative 2 indicated an adverse condition related to increased flows to the western side of the ENP. Although the operational change should improve the conditions for the Cape Sable Sparrow, less flow will be sent to the Lostmans Slough area.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component II3

Geographic Region: Everglades Agricultural Area (EAA) - Palm Beach County

Component Title: Pump Station G-404 Modification

Purpose: Increase the capacity of proposed Everglades Construction Project (ECP) pump station G-404 to improve the hydropattern restoration in the northwest corner of Water Conservation Area 3A (WCA-3A) and increase the amount of water available in the central region to reduce dry out periods.

Operation: Pump the maximum Stormwater Treatment Area (STA) 3/4 treated discharge possible across the Miami Canal from the L-5 borrow canal to the L-4 borrow canal to the northwest corner of WCA-3A. The treated discharge will sheet flow across the northern reach of WCA-3A between the Miami Canal and L-28 and flow down the L-28 canal through structure S-140. This additional water should improve the hydropattern restoration and reduce the number of dry out periods in the central region of WCA-3A. This diversion of water from the northeast section of WCA-3A should reduce the inundation duration and extreme high water depths in this sector of the water conservation area.

**Design:**

Increase the capacity from 1000 cfs to 2000 cfs on this proposed vertical, axial flow, low head, high capacity pump station (may be slightly resized after further hydraulic analyses).

Location: Confluence of Miami Canal, L-5 Borrow Canal and the L-4 Borrow Canal north of the S-8 Pump Station in southwestern Palm Beach County.

**Assumptions and related considerations:**

- (1) Land Availability.
- (2) Compatibility with proposed G-404 design.
- (3) Modifications to the L-4 and L-5 borrow canals if needed to increase the conveyance capacities to handle the additional conveyance.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component JJ3

Geographic Region: Water Conservation Area 1

Component Title: Loxahatchee National Wildlife Refuge Rainfall-driven Operations

Purpose: Base operations on a rainfall-driven schedule to provide improved timing and location of water hydropattern restoration and decreased stage in the southern region to more closely approximate natural system hydropatterns.

Operation: Replace the current schedule with a rainfall-driven operation that is primarily based on the estimated pre-drainage condition water levels that were derived from the Natural System Model. Under this procedure, deliveries to the refuge from Lake Okeechobee via Stormwater Treatment Area (STA) 1W would mimic natural system-like water level conditions. During high flow periods, excess water would be discharged downstream, regardless of receiving water levels. If stages at the monitoring locations are below their respective targets, water will be delivered from upstream locations.

Design: Excess water will be discharged through STA-1E and 1W, and Lake deliveries will be made as needed through STA-1W prior to entering the Loxahatchee National Wildlife Refuge. The treated discharge will be distributed via the L-7 and L-40 borrow canals from the outflow pump stations at STA-1W and 1E respectively. Appropriate monitoring stations within the refuge will trigger discharges and the volume.

Location: Within the existing boundaries of the Loxahatchee National Wildlife Refuge in Palm Beach County near the area known as Twenty-mile Bend.

Assumptions and related considerations:

- (1) Consideration given to minimum floor levels consistent with SFWMD's proposed minimum flows and levels for the refuge.
- (2) Potential increases in hydropatterns in dry areas and decrease in deep water areas.
- (3) Water deliveries made to the Loxahatchee National Wildlife Refuge are assumed to be of acceptable water quality.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component KK3

Geographic Region: Water Conservation Area 1

Component Title: Loxahatchee National Wildlife Refuge Internal Canal Structures

Purpose: Improve timing and location of water depths in the Refuge.

Operation: In conjunction with rainfall-based operational rules, structures would remain closed until triggered by a high level at the stage monitoring station in the area north of the structures. Water supply deliveries could also necessitate opening the gates. Excessive levels in both the north and south areas would trigger a release to WCA-2A regardless of the WCA-2A stage.

Design:

- (1) L-7 borrow canal structure: 1500 cfs gravity structure at 0.5 foot head.
- (2) L-40 borrow canal structure: 1500 cfs gravity structure at 0.5 foot head.

Location: The L-7 structure is located at cell R28C50 in the L-7 borrow canal within the Loxahatchee National Wildlife Refuge. The L-40 structure is located at cell R34C50 in the L-40 borrow canal within the refuge.

Assumptions and related considerations:

- (1) Water deliveries made to the Loxahatchee National Wildlife Refuge are assumed to be of acceptable water quality.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component LL3

Geographic Region: Lower East Coast Service Area 1

Component Title: C-51 Regional Groundwater Aquifer Storage and Recovery (ASR)

**Purpose:** This is a regional groundwater aquifer storage and recovery system which will capture and store excess water during wet periods and recover the water for utilization during dry periods. Use of the recovered water during dry periods will make more local water available and reduce the need for regional system water.

**Operation:** Water will be captured and stored when water is being discharged out of S-155 to tide. Water will be recovered during dry periods based on canal elevations. Recoverable water is limited to 70 % of injected water.

**Design:** This component consists of 34 well clusters located along the West Palm Beach Canal, each being composed of two (2) surficial aquifer wells and one Upper Floridan aquifer ASR well. The surficial aquifer wells will each have a 2.5 mgd withdrawal capacity and be located in proximity to the canal so that the water withdrawn would result in the interception of water that would otherwise go to tide in wet periods. Each upper Floridan aquifer ASR well will have a capacity of 5 mgd. (The total injection and recovery capacity of the ASR system is 170 mgd.) Water will be injected when stages in the C-51 Canal are above 8.0 feet NGVD. Water will be retrieved from the ASR wells when canal stages are below 7.8 feet NGVD. Recovered water will be discharged to the C-51 Canal.

**Location:** Along the C-51 Canal in Eastern Palm Beach County east of U.S. Route 441.

**Counties:** Palm Beach

**Assumptions and Considerations:** It is assumed that groundwater ASR in proximity to the C-51 canal is permissible without treatment.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component MM3

Geographic Region: Lower East Coast Service Area 1

Component Title: Hillsboro Canal Basin Regional Groundwater Aquifer Storage and Recovery (ASR)

Purpose: This is a regional groundwater aquifer storage and recovery system which will capture and store excess water during wet periods and recover the water for utilization during dry periods. Use of the recovered water during dry periods will make more local water available and reduce the need for regional system water.

Operation: Water will be captured and stored when water is being discharged from the coastal Hillsboro canal basin to tide. Water will be recovered during dry periods based on canal elevations. Recoverable water is limited to 70% of injected water.

Design: This component consists of 37 well clusters located along the West Palm Beach Canal, each being composed of two (2) surficial aquifer wells and one Upper Floridan aquifer ASR well. The surficial aquifer wells will each have a 2.5 mgd withdrawal capacity and be located in proximity to the canal so that the water withdrawn would result in the interception of water that would otherwise go to tide in wet periods. Each upper Floridan aquifer ASR well will have a capacity of 5 mgd. (The total injection and recovery capacity of the ASR system is 185 mgd.) Water will be injected when stages in the Hillsboro Canal are above 7.1 feet NGVD. Water will be retrieved from the ASR wells when canal stages are below 7.0 feet NGVD. Recovered water will be discharged to the Hillsboro Canal.

Location: Along the coastal reach of the Hillsboro Canal in Palm Beach and Broward Counties

Counties: Palm Beach, Broward

Assumptions and Considerations: It is assumed that groundwater ASR in proximity to the Hillsboro Canal is permissible without treatment.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component NN3

Geographic Region: Lower East Coast Service Area 2

Component Title: North New River Regional Groundwater Aquifer Storage and Recovery (ASR) – SEE COMPONENT MAP 10

**Purpose:** This is a regional groundwater aquifer storage and recovery system which will capture and store excess water during wet periods and recover the water for utilization during dry periods. Use of the recovered water during dry periods will make more local water available and reduce the need for regional system water.

**Operation:** Water will be captured and stored when water is being discharged from the North New River to tide. Water will be recovered during dry periods based on canal elevations. Recoverable water is limited to 70% of injected water.

**Design:** This component consists of 25 well clusters located along the North New River Canal, each being composed of two (2) surficial aquifer wells and one Upper Floridan aquifer ASR well. The surficial aquifer wells will each have a 2.5 mgd withdrawal capacity and be located in proximity to the canal so that the water withdrawn would result in the interception of water that would otherwise go to tide in wet periods. Each upper Floridan aquifer ASR well will have a capacity of 5 mgd. (The total injection and recovery capacity of the ASR system is 125 mgd.) Water will be injected when stages in the North New River Canal are above 3.6 feet NGVD. Water will be retrieved from the ASR wells when canal stages are below 3.5 feet NGVD. Recovered water will be discharged to the North New River Canal.

**Location:** This component will be located along the coastal reach of the North New River Canal in Broward County centered in the reach of the canal downstream of Water Conservation Area 2B and upstream from the Sewell Lock. The location has been set so as to avoid competition with Component P which is capturing western North New River Canal water for treatment and backpumping into Water Conservation Area 3A and to avoid causing saltwater intrusion by withdrawing water too close to Sewell Lock.

**Counties:** Broward

**Assumptions and Considerations:** It is assumed that groundwater ASR in proximity to the Hillsboro Canal is permissible without treatment.



**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component OO3

Geographic Region: South Dade

Component Title: Reduce Wet Season Flows to South Dade in Southern Portion of L-31N and C-111

Purpose: To reduce wet season flows in L-31N and increase deliveries to Northeast Shark River Slough in Everglades National Park and decrease potential flooding problems in the lower east coast service area.

Operation: Implement Phase II Experimental Program of Water Deliveries to Everglades National Park operations. This will improve conveyance from L-31N to L-31W through S-332D and reduce flood flows to C-111 basin by reducing S-176 releases. This will be accomplished by treating G-211 as the wet season hydrologic divide along L-31N and S-338 along C-1W.

Design:        Increase S-332D to 500 cfs (As authorized by Phase II  
                    Experimental Program and C-111)  
                    Remove S-332B  
                    Add 100 cfs to S-332C (keep total of S-332 A-D < 1200 cfs)  
                    Remove S-332 pump station  
                    Remove Pump Station S-332D connector canal, which provides  
                    flow from C-111 to S-332.

Location: South Dade Conveyance System  
Counties: Dade

Assumptions and related considerations:

1. Will not cause adverse impacts to Everglades National Park and lands east of L-31N and C-111.
2. This component is dependent on component FF.
3. Dry Season water supply will continue through G-211 and S-331.

**-Draft-**  
*C&SF Comprehensive Review Study – Alternative 3*  
Component PP3

Geographic Region: North Dade

Component Title: Backpumping of the C-7 Basin to the Central Lake Belt Storage System via the C-6 Canal.

Purpose: To capture a portion of wet season flows from the C-7 basin to tide through backpumping runoff from the basin to the Central Lake Belt Storage Reservoir and to decrease flooding problems in the C-7 basin.

Operation: Reduce flood flows to tide through pumping runoff from the C-7 canal west to the C-6 canal at G-72. This excess water can then be pumped to the Lake Belt Storage Reservoir along with C-6 basin runoff that is proposed to be back pumped in component S. The pump from the C-7 canal should be operated when S-27 structure is above 2.0 feet NGVD. C-6 pump should be operated to back pump to the Central Lake Belt Storage Reservoir as per the previous component S design and additionally when the C-7 pump is operated.

Design: 300 cfs pump from C-7 canal at G-72 to C-6 Canal  
Increase C-6 pump from 300 cfs to 600 cfs

Location: C-7, C-6, and Central Lake Belt Areas

Counties: Dade

Assumptions and related considerations:

- (1) All water quality considerations will be addressed regarding backpumping C-6 and C-7 basins to the Central Lake Belt Storage Reservoir to be used for water supply.
- (2) This component is dependent on component S.
- (3) Dry Season water supply will continue to maintain S-27 without change.